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HARVARD UNIVERSITY
ARNOLD ARBORETUM
PRESENTED BY CHARLES SPRAGUE SARGENT
1892

ESSAYS

ON

NATURAL HISTORY

AND

RURAL ECONOMY.

BY THE LATE

JOHN WALKER, D. D.

PROFESSOR OF NATURAL HISTORY IN THE UNIVERSITY OF
EDINBURGH.

LONDON:
PRINTED FOR LONGMAN, HURST, REES, AND ORME;
AND,
EDINBURGH,
FOR GUTHRIE & ANDERSON, SOUTH-BRIDGE.

1812.

May 1912
26491

Printed by C. Stewart, Edinburgh.

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A
CATALOGUE
OF SOME OF THE
MOST CONSIDERABLE TREES
IN
SCOTLAND.

THE largest trees on the globe, must naturally be in the hot climates, where vegetation is most vigorous and luxuriant. Among these the Bearded fig * and the Mahogany, are often mentioned as growing to an enormous size. In Barbadoes, a Bearded fig was found to measure 54 feet in circumference †. And a plank of Mahogany, as we are told, has been brought to England, which measured no less than 16 feet square ‡. The circumference of the tree

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* Ficus Benghalensis. Lin.

† Hughes's Nat. Hist. of Barbadoes. Lond. 1750. p. 175.

‡ Presented to Sir Robert Walpole, and still preserved, as is said, at Houghton.

tree which afforded such a plank, may be fairly estimated at between 60 and 70 feet.

Though North America is filled with woods which contain trees of a large size; yet we hear not of any that are of such an immense bulk. Dr. Franklin, who had seen much of the different provinces, and had been much in the Indian country, remarked in conversation, that the largest perdifol tree he had occasion to observe, might have been grasped by two men. This was a Hiccory, which he measured geometrically, and found it to be 180 feet high. But he added, that there were many Pines of a much larger size. It is likely, however, that the trees in the American woods in general, are more remarkable for their great height, than for the grossness of their trunk.

The trees of the same species, in the southern parts of Europe, are probably larger than in Britain, but we have little precise information concerning their dimensions. We are told *, that English Elms planted at Aranjuez in Spain, by Charles V. and said to have been brought from England, were above 20 years ago, about six feet in diameter, and without any appearance of decay. Though this tree has immemorially been planted in England, its growth in that country, seems not to be equal to

what

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* Baron Dillon's Travels, 1782. 4to. p. 182.

what it is in Spain. Yet other trees which are natives of Europe, appear to arrive in England at greater size, than in any other of the northern countries. This may be reasonably expected, from the great depth and fertility of the soil, in many parts of England, and from the mildness of the climate. The immense bulk of some oaks in England, is recorded by several writers; and we are not at least informed, of any so large in foreign parts. A Wych Elm in Staffordshire, mentioned by Dr. Plot*, was found to be 17 yards in circumference. But though the tree is a native of Scotland, though it abounds, and is in many places, of a great age, it is no where known to approach to this size.

An account of the dimensions of the most remarkable trees, in any country, would be highly useful. But along with these, the situation and soil, in which the tree stands, should be carefully marked; and especially its age, wherever that can be exactly known. Likewise its progress during any determinate number of years; and its present state with respect to decay or durability. The dimensions of a remarkable tree being thus fixed at any certain period, its progress can easily be determined by future observers. A register of this kind would greatly enrich the history of vegetation, and afford many useful conclusions, in the cultivation both of forest and fruit trees.

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* Plot's Nat. Hist. of Staffordshire, p. 211.

With these views, the following Catalogue of some of the most considerable trees in Scotland, has been made up, in the course of above forty years. As the fairest and most convenient place, for measuring the trunk of a tree, is about breast-high; the trees in the following list, were all measured at the height of four feet above ground, except where their measure at any other place is particularly mentioned.

QUERCUS ROBUR, LIN.

THE OAK.

	Ft.	In.
AN Oak at Lockwood in Annandale, which stands about due north from the old castle.		
On the 29th of April, 1773, it was measured six feet above the ground, and found to be in circumference	14	0

It was about 60 feet high, with a fine spreading head, exactly circular, covering a

Ft. In.

space of about 60 feet diameter. This is the finest tree at the place, though another was measured, which was near 15 feet in girth. There are here a great number of Oaks, approaching nearly to the same size. From a few that were cut down, they appear to be at present, about 230 years old. They stand on a good dry woodland soil, but in a high and exposed situation, and not less than 900 feet above the level of the sea.

An Oak at Blarquosh, in the parish of Strathblane, Stirlingshire, adjoining to the public road, measured in girth, an. 1796 ·· 15 0

The spread of its branches is 30 yards in diameter. There is another oak near it, which is a more beautiful tree, but not quite so large *.

An Oak at Barjarg, in Nithsdale, on the 15th of July, 1796, measured in circumference, close by the ground·············· 17 0

At the height of 16 feet, it measured 11 feet 11 inches. At 32 feet high, 11 feet 7 inches: and at the height of 46 feet, it was 6 feet 8 inches round.

---

* Stat. Hist. vol. 18. p. 580.

Ft. In.

On the 13th of July 1773, this tree measured at the ground, 16 feet; and at 16 feet high, 10 feet 3 inches: so that it is still in a progressive state.

In the year 1762, the late Lord Barjarg was informed by some very old people, that about 90 years previous to that date, this tree had been bored, with a design to have it cut down, if the wood had not been sound. From the hole bored, some branches proceeded, one of which was then a considerable bough.

It is probable, that this tree is not under 300 years old, and it may perhaps be considerably older. The present proprietor of the estate, the Rev. Professor Hunter, has been offered 30l. for this oak; but instead of accepting the offer, is at the greatest pains to preserve it as long as possible.

A decayed oak, upon the road between Inversanda and Strontian, in Argyleshire, was measured on the 27th of October, 1764. One foot above the ground, it was in girth 17 3

Four feet high, it measured 16 feet, 3 inches, and at the height of 15 feet, where the first branch set off, 13 feet in girth.

The remains of many other great Oaks,

Ft. In.

approaching to the same size, were observed in this Valley of Morven; yet they were all situated among rank heather, in deep peat earth, lying above banks of mountain gravel.

An Oak upon Inch Merin, in Loch Lomond. It stands near the middle of the island, towards the east side, and measured on the 22d of September, 1784 .... 18 1

It is situated in a moorish, weeping soil, is fresh and vigorous, and remarkable for its fine expanded head, without any appearance as yet, of the stag horns. The Oak on the island, next in size to this, measured 11 f. 2 inches round.

Wallace's Oak, at it has been called for some ages, still remains in the Tor Wood, near Stirling. The old tradition of the country, bears; that Sir William Wallace, after a lost battle, secreted himself in this tree, and escaped the pursuit of his enemies. By this account, it behoved then, that is, about 500 years ago, to have been a large tree. Whatever may be its age, it certainly has in its ruins, the appearance of greater antiquity, than what I have ever observed in any tree in Scotland.

Ft. In.

At a very remote period, it has separated in the middle, and the one half of it has mouldered entirely away. The other half remains, and is in one place, about 20 feet high. But what the tree was above this height, is unknown. All the original part of the tree is putrid, yet one may perceive, that the whole of it, from the heart to the very bark, has been red wood, and is so hard, even in its putrid state, as to admit of a polish.

In this ancient Tor Wood, it stands, in a manner, alone. For there are no trees, nor any ruin of a tree to be seen, that is nearly coeval. Compared to it, even the oldest of them is but of a very modern date. The memory of its having saved Wallace, has probably been the means of its preservation, when all the rest of the Wood, at different times has been destroyed. It has been immemorially held in veneration, and is still viewed in that light.

There is a peculiar sort of renovation of an old tree, that sometimes occurs, and which has taken place in this. A young bark has shot upwards from the root, in several places, which has formed fresh branches towards the top of the old trunk. This young bark has spread, and still spreads like a callus, over several parts of

Ft. In.

the old tree that are dead; and particularly over a very large arm, which has no bark on it, in the remembrance of the oldest person alive.

In 1771, by the nearest guess that could be made, of the size of this tree, from the half that remains, it has been in circumference, four feet above ground, about ······ 22 0

Its trunk has never been tall, for, about 10 feet from the ground, it has divided into several large arms, affording at the place of division, a very convenient covert for a man. One of these arms, without any bark on it, measured 7½ feet round.

The tree stands in carse land, in a deep, wet clay soil. The road that passes by it in the wood, is laid crossways, with thick branches of trees, to prevent carriages from sinking to the axles in wet weather.

In the very old Oak wood, on the north side of Loch Arkeg, in Lochaber, there are many trees from 10 to 14 feet in girth: and one has been measured at that place, which was found to be four feet above ground ···· 24 6

This is the largest, of which we have any account, in Scotland. But from difference of soil and climate, greatly inferior to the large Oaks in South Britain. Mr. Beevor *, an ingenious observer of the trees in England, informs us, that the largest oak he had seen, is that near Wetherby, which at the height of four feet, is 40 feet, 6 inches round. But there are others in England, which are said to be still larger.

FRAXINUS EXCELSIOR, Lin.

THE ASH.

	Ft.	In.
An Ash at Mellerstain House, in Berwickshire. It stands in a plantation, by the side of the east avenue to the house. It is a vigorous thriving tree, near 80 feet high, and was about 80 years old, in September 1795, when it measured	8	1

An

---

* Bath Memoirs, an. 1780. vol. 1. p. 76

Ft. In.

An Ash in the old castle, which was antiently the residence of the Earls of Lenox, upon Inch Merin, in Loch Lomond. It grows in what was the hall of this castle, on the top of a vault. It is near 50 feet high, and on the 22d of September, 1784, measured 8 8

This tree shews to what a large size the Ash will arrive, in a hard, dry, and stony situation.

An Ash at Loudoun Castle, in Ayrshire. It stands in the fruit garden, which is south-west from the castle. It is about 70 feet high, and on the 16th of October, 1776, measured 9 7

An Ash near the House of Cames, in the Isle of Bute. In the year 1771, it was 80 years old, was about 60 feet high, and measured, in the month of September in that year 10 10

An Ash at Lockwood in Annandale. It stands about 40 yards south from the old castle, and in a good soil, though in a high

and

Ft. In.

and exposed situation. On the 29th of April, 1773, it was a fresh vigorous tree about 70 feet high, and measured········ 10 6

An Ash at Newbottle. in Mid Lothian. It stands east from the Marquis's house, in the pleasure ground, near the river. On the 6th July, 1789, it measured········ 11 4

This tree was not so remarkable for the thickness of its trunk, as for its great height. It had upwards of 50 feet of clear stem, was evidently the tallest Ash that had been observed in Scotland, and was presumed to be a full 100 feet high. Lord Ancrum was so good as to have it accurately measured, when it was found to be 112 feet high. But great part of its head has since been broken over in a storm.

An Ash in the Island of Loch Leven, in Fifeshire, on the 17th of September, 1796, measured ····················· 12 0

There are other very old Ash and Thorn trees on the island, probably of an æra not much later than the building of the castle.

Ft. In.

An Ash at the ferry over the Tay, near the church of Logierait, in Perthshire, in July, 1770, measured ………………… 16 0

It is a healthy, well-shaped tree, about 70 feet high, and is well known in the country, by the name of the Ash tree of the boat of Logierait.

An Ash, in the church yard of Bonhill, in Dunbartonshire, in September, 1784, measured ………………………… 17 9

But at the height of one foot above ground, it was found to be no less than 33 feet in girth. The trunk divides into three great arms, at the height of six feet. It has a vast spreading head, but is not above 50 feet high.

This tree was measured by Mr Beevor*, in the year 1768, who found it to be 16 f. 9 inches in circumference, at the height of five feet. Though certainly of a great age, it is as fresh and vigorous as an Ash 20 years old.

An Ash at Castle Huntly, in the parish of Longforgan, in Perthshire, called the

Glames

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* Bath Memoirs, 1780. vol. I. p. 77.

	Ft.	In.
Glames tree, in the year 1796, was found a yard high, to measure	17	0

Near the root, it measured 27 feet *.

An Ash on Inch Merin, in Loch Lomond, in Dumbartonshire, in September, 1784, measured	20	8

Another Ash on Inch Merin, and not far from the former, towards the north end of the island, in September 1784, measured	28	5

These two trees have been broken over, about seven or eight feet above ground, much above half a century ago; as there is a group of large boughs, growing from the top of their old trunks, as from a pollard. Both trees are hollowed, and each forms a great bulk of living and dead timber, strangely mixed and interwoven by a succession of growths.

Near the house of Bonhill, in Dumbartonshire, there is a very antient and remarkable

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* Stat. Hist. Vol. XIX. p. 467.

Ft. In.

able Ash, the property of Colonel Smollet, of the guards, who lived a short but most meritorious life, and lately died a most honorable death. Being a sort of family tree of the Smollets, it has formerly been surrounded with a sloping bank of earth, about three feet of perpendicular height, designed for its preservation, and which to a great degree, has answered the purpose. In September, 1784, a little above the top of the bank, or about four feet above the natural surface, this remarkable tree measured···· 34 1

At the height of four feet above this bank, it measured 21 feet 3 inches. And at the height of 12 feet from the ground, immediately under the three great arms into which it divides, 22 feet 9 inches. At the junction of these arms, the leading trunk, had above a century ago been broken over, in consequence of which, the tree had become hollowed. One of these arms measured 10 feet 4 inches, another 11, and the third 12 feet in girth: and yet they seem not to have been original branches, but only pollards formed after the trunk was broken over.

Many years ago, the tree being hollowed, and open on one side, the opening was formed into a door, and the rotten part of the tree scooped out. In this way, a small room was formed within the trunk, of the following dimensions.

It is 9 feet 1 inch in diameter. Its roof is conical, and 11 feet high. It is floored, and surrounded with a hexagonal bench, on which eighteen people can sit, with a table in the middle. And above the door, there are five small leaden windows.

Though the tree has decayed in the heart, it continues to live in the bark, and to form a great deal of new wood. The whole trunk, which is a vast mass, is thickly covered with fresh, vigorous branches, and by this sort of renovation, may continue to live, no body can say how long.

An Ash, in the church yard of Kilmalie, in Lochaber, the parish church of the Lochiel family. This was long considered as the largest and most remarkable tree in the Highlands. It was held in reverence by Lochiel, and his numerous kindred and clan, for many generations, which probably hastened its destruction. For, in the year 1746, it was burnt by the soldiery to the ground. Its remains were examined on the 23d of October, 1764. Its circuit, at the ground, could then be traced, most parts of the circumference of the putrid trunk being

Ft. In.

several inches, and others, about a foot, above the surface of the earth. Its diameter, in one direction, was 17 feet 3 inches, and the cross diameter, 21 feet. Its circumference at the ground, taken in the presence of Henry Butter, Esquire, of Faskaly, and Mr. Campbell, Collector of the Customs, at Fort William, was 58 0

It stood in a rich deep soil, only about 30 feet above the level of the sea, in Lochiel, with a small rivulet running within a few paces of it. No information could be obtained concerning the exact size of the trunk. A person present, who had been well acquainted with the tree, described it as being of a vast bulk, but not tall, as it divided into three great arms, about eight feet from the ground. The place was visited again in the year 1771, when the above vestiges of this tree were quite obliterated. The circumference of this tree is the largest that has yet been noticed in any part of Scotland. But if the Bonhill tree above described, could be measured at the ground, it would probably be found to be as extensive.

ULMUS CAMPESTRIS, LIN.

SCOTS ELM.

	Ft.	In.
AN Elm, being the first tree, on the left hand, without the door, which opens at the end of the walk, at the head of the College garden at Glasgow. On the 1st of June, 1764, it measured	8	5
An Elm, being the first tree on the left hand, without the door, which opens to the rivulet, at the foot of the College garden, in Glasgow. On the 1st of June, 1764, it measured	9	5
An Elm, north from the House of Drumlanrig, in Nithsdale, on the outside of the wall of the gardens. On the 23d of April, 1773, it measured	9	4

Ft. In.

An Elm, at Newbottle Abbey, in Mid Lothian, which stands north-west from the house. On the 6th of July 1789, measured 10 4

It seems to be contemporary with the old Plane trees, which stand next to it, and which were planted before the Reformation. But it is neither so large, nor has it so much the appearance of age.

An Elm, in the parish of Roxburgh, in Tiviotdale, called the Trysting Tree, was measured in the year 1796 *, and found to be in girth, about 30 0

Though the Scots Elm abounds with us, both in natural woods and plantations, yet in England, where it is called the Wych Elm, it is often to be seen of a much larger size. The Wych Elm at Bradley church, in Suffolk, measured an. 1767, 5 feet high, 26 feet 3 inches †. And Dr. Plot gives an account of a Wych Elm in Staffordshire, which was 51 feet in circumference, at the but end ‡.

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* Stat. Hist. vol. xix. p. 134.

† Bath Memoirs, 1780. vol. i. p. 77.

‡ Plot's Nat. Hist. of Staffordshire, p. 211.

FAGUS SYLVATICA, Lin.

THE BEECH.

Ft. In.

The largest Beech at Bargaly, in the Stewartry of Galloway, was measured in September, 1780, and found to be······ 8 0

This tree had a clean trunk of 30 feet, and was about 80 feet high. It was planted in the year 1697, in a rich soil, and in our best climate.

The large Beech at Newbottle Abbey, standing on the lawn behind the house. On the 6th of July, 1789, it measured······ 17 0

A vigorous and healthy tree, with an immense head. The span of its branches was 89 feet.

A Beech, at Taymouth, of a like size, and seemingly coeval with this, was over-

Ft. In.

turned by a storm, some years ago, when it had arrived at above 16 feet in girth.

The large Beech at Ormistonhall, in East Lothian, was measured on the 10th of May, 1762, when it was ·················· 18 10

The large Beech, near the House of Oxenford, in Mid Lothian, was measured on the 6th of June, 1763. At the height of three feet from the ground, it was ······ 19 6

But by laying the line so close, as to measure all the angles of the trunk, its girth at that height, was 24 feet 9 inches. This fine tree was then upon the decay. It is probably the oldest of its kind in Scotland.

The Beech was not copiously planted in Scotland, till a little before and after the Revolution; and the trees planted about that period, do now form in many places, considerable timber, as at Inveraray, Arniston, Hopetoun House, and elsewhere. But the four trees last mentioned, which appear to be nearly contemporary, are of a much more remote æra. They seem to have been planted single, and merely as a curious foreign tree, in the garden of some eminent person. From their dimensions, and manner of growth, they may be presumed, at least, to have been planted between the years 1540, and 1560. So that they may now be estimated at between 240 and 260 years old. From the state of the Ormistonhall, and Newbottle tree, it may be concluded, that the Beech, if it meets with no accident, will grow with sound timber, for at least 250 years.

ACER PSEUDO-PLATANUS, Lin.

THE PLANE.

	Ft.	In.
A plane, at Redhall, in Mid Lothian, in the walk leading down from the house to the garden, on the third of October, 1798, was	8	9

Ft. In.

A Plane at Nisbet, in Berwickshire, on the south side of the walk in the shrubbery, leading to the garden. On the 15th of September, 1795, it was about 60 feet high, and measured 8 6

A Plane at Lochwood, in Annandale. It stands near the ruins of the old castle, on the west side, and measured on the 29th of April, 1773 . . . . 8 9

It was then a fresh vigorous tree, about 50 feet high, and not in the least wind-waved, though in a very high and exposed situation.

A Plane, at Redhall, in Mid Lothian. It stands on the road to the garden, but not far from the door of the house. On the 3d of October, 1798, it measured 9 4

A Plane, at Newbottle Abbey, in Mid-Lothian. It stands north-east from the house, towards the river, and on the 6th of July, 1789, measured 9 11

Ft. In.

This tree is not so remarkable for its large trunk, as for its great height. It stands near the very tall ash formerly mentioned. It was measured at the same time, and found to be 100 feet high. It is probably therefore, the tallest plane in Scotland.

A Plane, at Nisbet, in Berwickshire. It stands on the lawn, behind the house, and is the largest tree about the place. It is between 60 and 70 feet high, and measured on the 19th of September, 1795 ········ 12 3

The Plane trees already mentioned, and even those of a larger size, and of a much older date, have still the appearance of being unimpaired. The Plane is certainly a very long-lived tree. One was cut down some years ago, in the parish of Moffat, which was 13 feet 8 inches in girth, four feet high; and yet the whole of this great trunk was sound timber, from the center to the circumference.——Planes have been sold within these few years, at Castle Huntly, in Perthshire, for 13l. and 14l. each*.

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* Stat. Hist. vol. xix. p. 467.

Ft. In.

A Plane, in the garden, at Castle Menzies, in Perthshire, in September, 1778, measured 16 8

A Plane, at Calder House, in Mid Lothian. It stands in the pleasure ground, on the road from the house, down to the church. On the 4th of October, 1799, it measured 17 7

But, when the line was led along the surface of the concavities, it measured at the same height, 18 feet 3 inches. At the ground, it measured 20 feet, 3 inches. Its trunk is 12 feet high, and then divides into five great arms. Its branches extend in diameter, about 60 feet.

This tree is known to have been planted before the Reformation, and is supposed to be not less than 300 years old, yet has the appearance of being perfectly sound. It was the tree, to which long ago, the iron jugs at this place, were fastened. The tree came gradually to grow over them, and they have for a considerable time, been completely inclosed in its trunk. At the place where they were inclosed, there is a great protuberance on the south side of the tree, at the height of between four and five feet.

A Plane,

	Ft.	In.
A Plane, at Newbottle Abbey, situated north-west from the house, and the largest tree of the kind, about the place. On the 6th of July, 1789, it measured	18	7

At the height of 2½ feet from the ground, it was 24 feet 4 inches, and is about 70 feet high. It has the appearance of great antiquity, but seems still to be sound. Many other planes at Newbottle, were planted before the Reformation, and apparently about the same time with this, though they are inferior in size. This tree has probably been planted before the year 1530.

The first barren trees planted in Scotland, were those of exotic growth; such as the Plane, Elder, Beech, Chesnut, Lime, and Pitch and Silver Fir. These, at the time, were planted in gardens, rather from curiosity, or for ornament, than for use. We have no planted Oak, Ash, Elm, or Fir, of such an old date; as the country was then full of natural woods composed of those trees, and little demand for them.

FAGUS

FAGUS CASTANEA, Lin.

THE CHESNUT.

	Ft.	In.
Two Chesnut trees, at Rosebank, in Mid Lothian. Mr. Davidson planted two Chesnuts, in the parterre, before his house, at this place, in the year 1729. The two trees which sprang from them, were measured in July, 1761, when they were found to be in girth	5	4

Whether or not these two trees remain, is uncertain; but this stage of their growth, shews the quick and beneficial progress of the Chesnut.

	Ft.	In.
A Chesnut, at Lochnell, in Argyleshire, planted with a variety of other exotic trees, by the late Sir Duncan Campbell, was in July, 1771	5	0

It was then a thriving tree, 30 feet high, and just 36 years old.

	Ft.	In.
A Chesnut at Bargaly, in the Stewartry of Galloway, was measured in September, 1780: a very tall tree, about 80 f. high, and in circumference	7	3
A Chesnut, at Newbottle, in Mid Lothian, being the tree of this kind, that stands nearest the house. It has still the appearance of a young vigorous tree, and on the 6th of July, 1789, measured	11	9
There are some very large chesnut trees at Lord Gray's house of Kinfauns, in Perthshire. The largest of them was cut down in October, 1760, and measured	22	8

This tree was supposed by the proprietor, to be above 200 years old. All the branches had leaves and fruit upon them, the year it was cut, though the trunk was found entirely decayed. The cellular substance was shrunk, and apparently much consumed, so that the wood appeared to the eye, like a sponge, full of small holes. The ligneous fibres being left naked; appeared much more conspicuous, and were far more easily traced, than in sound wood. One instance, among many, to shew, that the cellular substance has no immediate concern in the formation of the flower and fruit, but serves chiefly as a reservoir of the sap to the fibrous part.

Ft. In.

The great Chesnut, which stood at Finhaven, in Forfarshire, was long accounted the largest tree in Scotland. In the year 1760, a great part of the trunk of this remarkable tree, and some of its branches, remained. The measures of this tree were taken before two Justices of the peace, in the year 1744. By an attested copy of this measurement, it appeared at that time, that at half a foot above the ground, it was · · · · 42 8½

As this Chesnut appears from its dimensions, to have been planted about 500 years ago; it may be presumed to be the oldest planted tree that is extant, or that we have any account of, in Scotland.

There was a Chesnut also, of surprising bulk at Leven Side, in Dnubartonshire. It was overthrown by the hurricane, on the 13th of January, 1739, 1739, but its precise dimensions have not been preserved.

In England, the Chesnut is still more remarkable for its growth. In the year 1759, a Chesnut in Lord Ducies garden, in Glocestershire, measured 46 feet, 6 inches, six feet high *. And Bradley mentions a Chesnut at Tartworth, in Glocestershire, which measured 51 feet in circumference, six feet above ground †.

From these instances, it would seem, that the Chesnut grows much faster, and to a greater size, than the oak, both in South and North Britain, and more so in Scotland, than perhaps any other forest tree.

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* Bath Memoirs, 1780. vol. i. p. 78.

† Bradley's Philosophical Account of the Works of Nature. Lond. 1739. p. 241.

PINUS SYLVESTRIS, LIN.

SCOTS FIR.

	Ft.	In.
IN the year 1740, the late Sir James Nasmyth formed at New Posso, in Tweeddale, a very extenſive Fir plantation, on the north side of a barren hill, of considerable height. In the year 1767, many of the trees in this plantation measured ········	4	0

At that time also, many of them contained from four to six inches of red wood.

At Auchinleck, in Ayrshire, an. 1766, the Firs in a plantation forty five years old, and in which they stood only seven feet distant, sold for 5s. a piece.

	Ft.	In.
A Fir, at Cameron, in Dunbartonshire, on the shore of Loch Lomond, below the house, measured in September, 1784····	7	2

A Fir

	Ft.	In.
A Fir, at Bargaly, in the Stewartry of Galloway, being then the largest about the place, measured in September, 1780	9	3

This tree was near 90 feet high, with 22 feet of clear stem, and was planted an. 1697. In the year 1779, another Fir of the same age was cut at this place, which contained 90 feet of timber.

	Ft.	In.
A Fir, at Castle Huntly, in Perthshire, measured in the year 1796, at the height of three feet above ground	13	6

It measured close to the ground, 19 feet, and it is likely, may be the largest planted Fir in the country.

The Firs in the Highlands, by the slowness of their growth, are more remarkable for the excellency of their timber, than for their great size. Few trees of this kind were planted before the beginning of the present century. Since that period, they have been planted indeed every where, in abundance; but have not yet had time to arrive at perfection, or at their full size. The fir is a tree that will grow 400 years. In Sweden, 360 circles have been numbered in a Fir, that was composed entirely of sound wood. The planted Scots Fir is at present depreciated, because it consists of white, soft, perishable wood. This is certainly the case. But the defect is chiefly owing, not to soil, or situation, but merely to want of age in the tree. In the course of years, that white wood will become red; and the planted Fir from time to time, will become more and more valuable in quality, and be held in greater estimation.

PINUS ABIES, LIN.

SPRUCE FIR.

	Ft.	In.
A Spruce Fir, at Bargaly, in the Stewartry of Galloway, in September, 1780, measured	5	2
This tree had 25 feet of clear stem. It was 80 feet high, and about 83 years old.		
Another, but not near so high, measured	6	6

	Ft.	In.
A Spruce Fir, the largest in the gardens, at Castle Menzies, in Perthshire, in September, 1778, was 80 feet high, and measured	9	0

The largest trees were formerly at Drumlanerig. They were planted about the year 1686, and being situated in ground full of weeping springs, rose to a great size. They were in full vigour, when cut down a few years ago, but their dimensions were not exactly taken.

The Spruce Fir has been copiously planted, but not often in its proper soil. For this reason, we seldom see it a large and vigorous tree. On a dry soil, it makes for some years, a very pleasant appearance, and soon flowers, but soon ceases to be luxuriant. For, when this tree, or any others, of the Fir or Pine kind, produce cones while they are yet young, it is certain, that they are not in their proper soil and situation. This premature fructification is always accompanied with a stunted growth.

The Spruce Fir only affords the white deal brought from the Baltick. The best red Fir brought from that country, and from Norway, is the produce of the Scots Fir.

PINUS

PINUS PICEA, Lin.

THE SILVER FIR.

	Ft.	In.
A silver Fir at Lochnell, in Argyleshire, in July, 1771, measured	6	6

It was about 60 feet high, and only 36 years old.

Another of the same age, measured 7 feet four inches, at the ground, and 6 feet 3 inches, at the height of four feet.

	Ft.	In.
A Silver Fir, at Bargaly, in the Stewartry of Galloway, in September, 1780, measured	8	0

This tree was planted an. 1797. It had a clear trunk of 35 feet, and was about 100 feet high. Another Silver Fir of the same age, was cut at this place, in the year 1780, which contained 100 feet of timber. But for the growth of a tree, there are few more select spots in Scotland, than Bargaly.

	Ft.	In.
A Silver Fir, at the House of Polkemmet, in West Lothian, in October 1799, measured	10	0

This tree was planted in the year 1705. It is at present little above 50 feet high. But 25 feet of its top were broken over by a hurricane, about 30 years ago. Its top now consists of many pollard shoots, which have sprung from the broken trunk.

	Ft.	In.
A Silver Fir, in the old garden, at Woodhouselee, in Mid Lothian, was, in March 1793	11	1

This tree, in March, 1759, measured 7 feet 4 inches. It was planted about the beginning of the present century, but has for several years been upon the decay.

	Ft.	In.
A Silver Fir, at Drumlanerig, in Nithsdale, on the 24th of April, 1773, measured exactly	12	0

This was the largest of six trees, which stood in a row, near the castle of Drumlanerig. They were placed only 12 feet distant from each other, and yet the other five were all above 10 feet in girth. They were planted in the year 1690, and were all about 80 feet high. They stood in a forced soil, perfectly dry, and were then evidently on the decline. Their timber, however, was still sound, and much commended by all the people who used it.

The Silver Fir is a tree of a very quick growth, but not long lived. In a low country, and in a dry soil, its decay seems to commence within a century. But in a mountainous and wet situation, as in the Italian alps, it is probably more durable. Mr. Marsham* informs us, that in the dock yards at Venice, he saw Silver and Spruce Firs above 120 feet in length; and one, which was 117 feet long, was 18 inches in diameter, at the small end. Such trees were probably of an age much beyond a century. At Bargaly, where both these trees were planted in considerable numbers, in the same situation, and at the

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* Bath Memoirs, 1780. vol. i. p 78.

same time, it appeared, that the Silver Fir is a tree of a much quicker and larger growth than the Spruce.

The first Silver Firs in England, were planted in Harefield Park in Middlesex, an. 1603. In the year 1679, the largest of them was 13 feet in girth at bottom, 81 feet high, and contained 146 feet of good timber*.

PINUS LARIX, LIN.

THE LARCH.

	Ft.	In.
A LARCH, in the Manse garden of Moffat, in September, 1785, was ············	2	3

This tree was then 28 feet 10 inches high, and 16 years old from the seed. It was transplanted from the seed bed at two years old, kept three years in the nursery, and then planted where it now stands, when it was five feet high.

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* Evelyn's Sylva, p. 283.

	Ft.	In.
In Mr. Stirling's garden at Leadhills, in Clydesdale, there is a row of Larch trees, which were planted an. 1748. The largest on the 7th of September, 1773, was about 40 feet high, and measured ············	2	3

This garden is in an exposed situation, and is the highest in Scotland, being more than 1600 feet above the sea. This tree shews the progress of the Larch, at that great height, in the course of 25 years. The Ash, Beech, Scots Elm, and Plane, were planted here at the same time, but none of them were either so large, or of such a vigorous growth as the Larch.

A Larch in the gardens, at Dunkeld, about 50 feet high, and 43 years old, measured in July, 1770 ··················	4	2

This was one of the two first Larches that were planted in Scotland. They were sent down from London, by the Duke of Athol, in the year 1727, along with some orange trees, and other greenhouse plants. They were kept with these, for two or three years, in pots, in a greenhouse, as rare exotic trees. But when their hardy nature came to be known, they were planted out in the garden. This tree, that remains, has a fine appearance, notwithstanding the errors of its education.

	Ft.	In.
But, in the Dunkeld gardens, at the same time, there was a number of Larch trees, above 60 feet high, and only 28 years old, several of which measured	5	5
The Duke of Athol, at this time, an. 1770, had planted about half a million of Larches.		

A Larch at Polkemmet, in West Lothian, being the largest tree of the kind, about the place, measured in October 1799,	5	2
It was planted in the year 1760.		

A Larch, at Orford House, near Warrington, in Lancashire. It stands before the court, in the way to the fruit garden, and measured in October, 1772.............	5	8

This tree was also brought from London, in a pot, in the year 1729, and kept for some time in a green-house, by the venerable Mr. Blackbourne, of Orford.

	Ft.	In.
A Larch, at Blairdrummond, in Perthshire, which stands in a plantation, on the bank behind the house. On the 15th of October, 1777, it measured ……………	6	6

One foot above ground, it measured 8 feet 3 inches; and measured geometrically, was found to be 83 feet high.

This tree had been measured in June, 1771, when it was 6 feet in girth, four feet high; and 7 f. 2 inches near the ground.

	Ft.	In.
At the House of Killearn, in Stirlingshire, there are several Larches, which at the thickest part of their trunk, an. 1794, were ……………………………	9	0

They were planted about sixty years ago, and are near 100 feet high *.

ÆSCULUS

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* Stat. Hist. vol. xvi. p. 111.

ÆSCULUS HIPPOCASTANUM, Lin.

HORSE CHESNUT.

A horse Chesnut, at Bargaly, in Galloway, in September, 1780, measured …… 6 10

This tree was 83 years old, and near 80 feet high [*].

The planting of the Horse Chesnut in Britain, is not of a very old date. The tree was first brought from the East into Europe, about the year 1550. A branch of the tree, with flowers, was received by Clusius, from Vienna, in the year 1603. He had never seen it till that time, and gave the first figure of it, in the year 1605 [†]. The tree was not planted at Paris, till the year 1616; and was probably first planted in England about that time, or soon after. The two trees on the lawn, which was formerly the garden, at New Posso, in Tweedale, are perhaps the largest in North Britain, and probably the oldest, as they are known to be about 150 years old.

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[*] A Horse Chesnut at Hatton, in West Lothian, measured 11 feet 4 inches, at four feet from the ground.

[†] Clusii Exoticorum, libri x. an. 1605. fol.

When the Horse Chesnut is in flower, it is the most ornamental of all our forest trees. The qualities of the timber are little known, but the nuts are an excellent food for deer and for hogs. They also possess a detergent quality, and serve in some degree, as a soap. They are used in Ireland [*], to whiten flax and cloth; and for this purpose are rasped into water, in which they are allowed to macerate for some time.

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[*] Dr. Rutty's Nat. Hist. of the County of Dublin, vol. 1. p. 107.

TAXUS BACCATA, Lin.

THE YEW.

	Ft.	In.
A Yew, in the garden adjoining to the old Abbey of Dryburgh, in Tiviotdale, on the 21st of June, 1763, measured	6	11

It was nearly of the same girth 8 feet high, where it divided into branches, but measured at the ground, 9 feet 9½ inches. It was not much above 20 feet high, but appeared thriving and vigorous, though probably planted before the Reformation. A person who had known it for 60 years, was not sensible of any great alteration in its appearance.

	Ft.	In.
A Yew, at Bonhill, in Dunbartonshire. It stands between the house, and the river Leven; was about 30 feet high, in September, 1784, and measured	9	4

	Ft.	In.
A Yew, in the garden at Broich, in Stirlingshire, measured an. 1794, at the height of two feet	10	0

It is about 50 feet high. Its branches spread in circumference, 140 feet, and is supposed to be 200, or 300 years old [*].

	Ft.	In.
A Yew tree, in the garden at Ormiston Hall, in East Lothian, on the 10th of May, 1762, measured	10	3

A Yew, at Balikinrain, in Stirlingshire, measured an. 1794 [†]	10	8

A Yew, at the House of Rosedoe, in Dunbartonshire, an. 1795, at 2½ feet above ground, measured [‡]	12	6

A Yew,

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[*] Stat. Hist. vol. xv. p. 328.

[†] Ib. vol. xvii. p. 245.

[‡] Ib. vol. xvi. p. 111.

	Ft.	In.
A Yew, in the island of Inch Lonach, in Loch Lomond, measured on the 3d of August, 1770	10	7

This tree was about 40 feet high, but another tree, which was the largest in the island, though not so tall, measured 13 feet in girth.

On the island, there is an extensive natural wood of Yew, which consists entirely of old trees; as the herd of deer which has been long kept upon it, prevents any young trees from getting up. Many of these Yews, when they have begun to decay, have sent up shoots from the root, close to the old trunk. A number of these coalesce, and form at last a compleat new trunk, at the side of which the old one continues to decay. In this way the tree comes to be regenerated from the root.

	Ft.	In.
The great Yew, at Fortingal, in Perthshire. This remarkable tree still remains. It was twice measured by the Hon. Judge Barrington, who, before the year 1770, found it to be in circumference, though without mentioning at what height[*]	52	0

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[*] Philos. Trans. vol. lix. an. 1770. p. 37.

The Yew has always been, and still is an indigenous tree in several parts of Scotland, particularly in the island of Bernera, adjacent to the Sound of Mull. The late Sir Duncan Campbell cut a Yew upon that island, of a vast size. Its precise dimensions were not preserved, but the timber of it deeply loaded a Highland six oared boat; and was sufficient to form a large elegant staircase, in the house of Lochnell, which was afterwards burnt.

BETULA ALBA, LIN.

THE BIRCH.

	Ft.	In.
A weeping Birch, at Ballogie, in the parish of Birse, in Aberdeenshire, measured an. 1792	5	0

It has a straight clear stem, of above 50 feet, all nearly of an equal thickness, and is judged to be about 100 feet high *.

In

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* Stat. Hist. vol. ix. p. 129.

	Ft.	In.
In the forest of Darnaway, in Moray, many birches are in girth*	9	0

This last measure is about the largest size of the Birch. It is a quick growing, but a short lived tree. In 30 years, it will rise 40 feet high, but seems to arrive at its full maturity, in about 70 years, or at most, within a century. Its chief merit consists in growing freely, in a mossy soil, and at a great height, where more valuable timber cannot be so soon, or easily raised.

TILIA EUROPÆA, Lin.

THE LIME.

	Ft.	In.
A LIME, near the House of Polkemmet, in West Lothian, and supposed to be about 70 years old, measured in October, 1799 ..	5	1

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* Stat. Hist. Vol. viii. p. 557.

We are told, that the two first Lime trees were planted in England, about the year 1590, and are still growing at Halsteds, in Kent. It is rather more probable, that the tree was introduced into England by the Romans, but it does not appear to have been planted in Scotland, before the reign of Charles the II. We have accordingly, no tree of this kind, of so great age, or of such a remarkable size, as many that are to be seen in England. The oldest, and probably the largest, are those at Taymouth and Inveraray.

POPULUS.

THE ABELE.

In the year 1769, there was a row of Abeles, at Stevenston, in East Lothian, which soon after was cut down. It contained 122 trees, all about 80 feet high, and from 20 to 30 feet of clear trunk, without a branch. The trunks were from 5 to 7 feet in circumference, and yet the trees stood only 7 feet distant from each other. They were placed in a deep moist soil, were then 80 years old, and afforded a great quantity of timber. As they were all evidently begun to decay, the Abele seems therefore to attain its maturity in about 80 years.

	Ft.	In.
An Abele, in the avenue in the front of the house of Drumlanerig, being the largest tree of the kind, about the place, measured on the 22d of April, 1773 ···············	7	10

This tree which stood on a dry soil, was 80 years old, and about 70 feet high.

It is doubted, whether or not the Abele is a native of England. It certainly has the appearance of an indigenous tree, in several parts of Scotland. It was planted in many places, about the end of the last, and in the beginning of the present century; but it has since been neglected. The wood is not valuable, and the tree becomes rather a nuisance, by the suckers with which it fills the adjacent soil.

JUGLANS

JUGLANS REGIA, Lin.

THE WALNUT.

	Ft.	In.
A WALNUT, in the garden, at Lochnell, in Argyleshire, measured in July, 1771	3	3

This tree was 25 feet high, and 36 years old.

A Walnut, at Alva, in Stirlingshire. It was planted in the garden, by Sir John Erskine, an. 1715, in the presence of his brother, the Lord Justice Clerk Tinwald, afterwards proprietor of the estate. In October, 1760, two feet high, it measured	5	4

At Cames, in the Isle of Bute, there is a number of Walnut trees, vigorous and well

Ft. In.

grown, which in September, 1771, were about 70 years old. They were then between 50 and 60 feet high, and the largest of them measured 6 1

A Walnut, before the front of Kinross House, in Kinross-shire, in September, 1796 measured 9 6

The House of Kinross was finished by Sir William Bruce, in the year 1684, and this tree appears to be coeval with the house. It is probably the oldest and largest Walnut tree in Scotland, and is evidently on the decay, but whether this proceeds from accident or from age, is uncertain.

The Walnut grows well with us as a forest tree; it is not impaired in winter, and in a favourable situation and season, even ripens the fruit. But the quality of the wood, compared to the foreign Walnut timber, or that of England, is but little, if at all known.

CRATÆGUS

CRATÆGUS OXYACANTHA, Lin.

THE HAWTHORN.

	Ft.	In.
The largest of the Hawthorn trees, on the Island in Lochleven, in Fifeshire, measured on September, 1796	6	4
A Hawthorn, at Castle Huntly, in Forfarshire, an. 1796, measured at the height of three feet high*	6	10
A Hawthorn, at the House of Kinkarochie, in the parish of Scone, in Perthshire, measured an. 1795†	9	0

The circular spread of its branches, 14 yards in diameter.

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[*] Stat. Hist. vol. xix. p. 467.

[†] Ib. vol. xviii. p. 73.

	Ft.	In.
A double flowered Hawthorn, in the wilderness, at the House of Blair in Athole, measured in July, 1770	2	8

It was 20 years old, and 15 feet high. It had been grafted at the height of four feet, and the stem and graft having grown equally, were strong and entire.

The Hawthorn is certainly one of the longest lived trees, and there are, no doubt, many in the country of a larger size, than those that are here mentioned. It grows briskly at first, but slowly as it advances in age. We have no planted thorns of an old date. The first hedges formed in Scotland, were on the road leading up Inch Buckling Brae, in East Lothian; and at Finlarig, at the head of Loch Tay, in Perthshire. They were planted at both places, by Cromwell's soldiers.——Of all the trees and shrubs now known, there is not one in any climate, which possesses the excellent properties of the Hawthorn, as a hedge. When it was first applied to this purpose in England, is uncertain; but we find that Hawthorn hedges were in use in Italy, before the year 1400 *.

CYTISUS

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* Petrus de Crescentia, lib. v.

CYTISUS LABURNUM, Lin.

LABURNUM.

	Ft.	In.
A laburnum, which was cut at Greenlaw, in Mid Lothian, in the year 1763, measured	4	6

This tree afforded a plank of beautiful red wood, 14 inches in breadth. It was planted in the end of the last century, when the Laburnum was first introduced into Scotland. It is a tree that well deserves its place in every plantation, on account of its very valuable timber. In planting Laburnum, it is necessary, however, to distinguish between the two varieties of the plant. The one grows up to be a timber tree, and is the only one that should be planted. The other is but a mere shrub, that never comes to be a tree: and yet when they are young, they are so much alike, that the one may be easily mistaken for the other.

ACER CAMPESTRE, LIN.

THE MAPLE.

	Ft.	In.
A MAPLE which stands near the House of Inveraray, in Argyleshire, measured in July, 1770	7	1

This fine tree, probably the oldest and largest in Scotland, had then a spreading head, about 40 feet in diameter. The Maple is so hardy, and its timber so valuable, that it is to be regretted, that it should be so little planted in this country.

	Ft.	In.
A Maple, at Culter, in Clydesdale, measured in the year 1800, at the height of three feet above ground	8	0

At the height of three feet above ground, it divides into two arms, one of which measures six feet round, two feet above the trunk; the other measured four feet two inches round, at the same height above the trunk.

CARPINUS BETULUS, Lin.

THE HORNBEAM.

	Ft.	In.
A hornbeam, at Bargaly, in Galloway, measured in September, 1780	6	2

It had 20 feet of clear trunk, and was about 70 feet high.

In several old gardens, there are hedges of Hornbeam; but it has been too much confined to that purpose. It is patient indeed under the knife of the scissars, and forms a very tall and fine hedge. But in this situation, it never forms timber, any more than the Beech. Whereas the Hornbeam, when planted single, rises to be a large forest tree; and the peculiar toughness and durability of its wood, render it a very eligible article in every plantation.

ACER PLATANOIDES, Lin.

NORWAY MAPLE.

	Ft.	In.
A NORWAY Maple, near the House of Mountstuart, in the Isle of Bute, measured on the 1st of September, 1786	5	4

It is the only tree of the species, upon the island, and was planted in the garden, by the late Earl of Bute, in the year 1738.

	Ft.	In.
A Norway Maple, near the House of Tyningham, in East Lothian, at the entrance to the shrubbery, measured on the 30th of October, 1799	7	3

This tree was planted in what was the garden, at the time, by the old Earl of Haddington, probably between the years 1720, and 1730. It is a healthy vigorous tree, and produces ripe seeds every year.

It appears, from these two instances, that the Norway Maple is capable of becoming a considerable forest tree in Scotland. It is properly a sort of maritime tree. It prospers on the sea rocks of Norway, and exposed to the sea spray, where no other tree succeeds so well. It yields not to the sea blasts, is never wind waved, and its timber is more valuable than that of either the Plane or the Maple. It is therefore, excellently adapted for the sea coasts of Scotland; but from want of information, or from inattention, it has never been propagated.

PLATANUS ORIENTALIS, Lin.

THE SYCAMORE.

Ft. In.

At Cames, in the Isle of Bute, there are several thriving Sycamores. The largest

standing

Ft. In.

standing in a row, measured in September, 1771 .... 4 1

This tree had 15 feet of clear stem, and was about 60 feet high.

In the year 1771, there was a row of Sycamores along the side of one of the streets in Rothsay, which were from 20 to 25 feet high. They were vigorous young trees, thriving almost like willows, but before the year 1784, they had all been removed by new buildings.

Ft. In.

A Sycamore, in the fruit garden, at Loudoun, in Ayrshire, west from the castle, measured on the 16th of October, 1776·· 4 5

A Sycamore, at Mountstewart, in the Isle of Bute. It stands in the avenue, in the wood, to the north of the house, and measured on the 1st of September, 1786·· 6 10

It was planted by the late Earl of Bute, in the year 1738.

The true Sycamore of the antients, and of the eastern nations, is now commonly known by the name of the Oriental Plane. It is remarkable for the beauty of its foliage, and for the full and fine shade which it affords. The qualities of its timber are little known. Though it has been but seldom planted, it appears from the above instances, to agree well with our climate, and especially near the sea. It is a finer tree, and more hardy, than the occidental Plane of America, which frequently suffers in its shoots, during winter.

POPULUS NIGRA, LIN.

BLACK POPLAR.

	Ft.	In.
A BLACK Poplar, at Alloa House, in Clackmannanshire, measured an. 1792, at the height of between three and four feet [*]	13	6

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[*] Stat. Hist. vol. viii. p. 594.

From the growth of this tree, and of those also, of a great size, which stand in Hamilton Haugh, in Clydesdale, it is to be regretted, that the Black Poplar has been so little cultivated in Scotland. It is excellently adapted for the carse countries, and wherever there is a deep and wet soil. It is a tree of a strong and quick growth, and its wood valuable for ship pumps, and all the purposes of the turner. But there is a more general and important use to which it is applied, in those parts of England where the tree abounds. The Black Poplar affords the finest deal, for the wainscotting of houses, and is preferred to the best Fir timber. It is cheap, easily worked, and in that situation, sufficiently durable. It takes such a fine polish, and receives the paint so kindly, that it forms a much handsomer painted wall, than either Oak or Fir.

POPULUS NIGRA, Lin. (β. Pyramidalis.)

LOMBARDY POPLAR.

	Ft.	In.
A lombardy Poplar, at Nisbet, in Berwickshire. It grows on the north side of the canal, opposite to the garden, and measured on the 15th of September, 1795 ········	6	1

This tree was then 26 years old, and was 60 feet high, so that its growth for such a period of time, was certainly very great.

What is called the Lombardy, or Italian Poplar, is only a variety of the Black Poplar, but grows in a very different form, and affects the pyramidal shape. Cuttings of this tree were first brought to London from abroad, by the Earl of Hertford, in the year 1763. Two young trees from these cuttings, were sent down in the year 1765, to New Posso, in Tweeddale, where they still remain; and soon after, considerable numbers of them came to be planted in Scotland. They have succeeded but in few places, having seldom been planted in a soil sufficiently deep and wet. Even in a dry situation, they outstrip most trees in growth, for a few years, but soon decay, and turn out good for nothing. They will grow tall, but without any thickness in proportion. The tree above described, however shews, that in a proper situation, the Lombardy Poplar is capable of affording an uncommon quantity of timber, in the course of 26 years. If it is to be planted at all, it should be in a deep soil, where the water stagnates near the surface. We are told, that on the borders of a canal, near Brussels, this tree, in the space of 15 years, has grown to be 80 feet high, and from seven to eight feet in circumference *.

POPULUS.

BALSAM POPLAR.

Ft. In.

A BALSAM Poplar, in Dr. Monro's pleasure ground, at Craiglockhart, near Edinburgh.

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* A MS. Account of this tree, from Brussels.

	Ft.	In.
Edinburgh. It stands by the side of the walk, near the river, and measured on the 25th of August, 1798 …………………	4	0

It was about 50 feet high, was planted in the year 1771, and is one of the oldest and finest trees of the kind, in the country.

The Balsam Poplar was first raised in a nursery ground, at Leith, by seeds sent from Canada, in the year 1768. It has since been much propagated, and promises to make a hardy forest tree. The size to which it will grow, and the qualities of the wood, are as yet unknown. The very early disclosure of its leaves in spring, and their fragrance, which perfumes the air, render it very agreeable. It bears cutting so well, that it may be formed into a hedge.

PINUS BALSAMEA, LIN.

BALSAM FIR.

THERE does not seem to have been any tree of this sort in Scotland, till after the year 1730. In the year 1743, the late Sir James Nasmyth sowed the seeds brought from America. The plants raised from them were 20 feet high, in the year 1760; when they produced ripe seeds, from which several hundreds of good plants were raised, in the year 1761.

The late Mr. Craick, also sowed the seeds from America, in the year 1734, and with the plants raised from them, formed several plantations, at his seat, of Arbigland, in Galloway. In the year 1769, when 35 years old, many of them were 50 feet high, and their trunks were from three to five feet in circumference.

These trees were remarkable for producing certain blisters or vesicles upon their trunks, filled with a fluid resin; an appearance not remarked in any other tree of the Fir or Pine kind.

These blisters rise between the bark and epidermis, and are of a round, or oblong convex figure, of the size of pease, hazel nuts, or small chesnuts. They are soft to the touch, and upon incision, their resin flows out.

In January, 1769, a quantity of this resin was collected in these plantations. When first received into a glass, it was of a greenish white colour, and turbid; but upon standing half a day, it became clear at top. After standing a week, it became altogether clear and colourless, like water, but was considerably thicker, than when first taken from the tree. It swims upon water, is neither diffusible nor soluble in it, but dissolves readily in spirit.——A little of this resin dropped on sugar, was repeatedly found to be a very expeditious remedy, in the case of a fresh cold, and cough.

These blisters were to be found only upon trees at Arbigland, the greater part being destitute of them. They prevailed most upon the trees which stood in a dry soil, whose branches were thin and slender, and whose growth was languid. None of them were to be seen upon such trees as stood in a wet boggy soil.

which were feathered to the ground with branches, and whose growth was luxuriant——A stunted vegetation on a dry soil, was evidently the cause of this extravasation of the resinous sap. And hence likewise we may perceive, what is the most proper soil for the Balsam Fir.

The resin thus obtained from these trees, is the same with what has been often imported from America, by the name of the Canadian Balsam. On that account, the tree has been called the Balsam Fir,and the Balm of Gilead Fir. I have twice seen, and only twice, the Balsam of Mecca, or the Balm of Gilead, in its genuine state, to which this resin of the Balsam Fir bears a most exact resemblance, in all its sensible qualities.

PINUS CEDRUS, LIN.

CEDAR OF LEBANON.

	Ft.	In.
A CEDAR of Lebanon, in the gardens at Hopetoun House, measured in September, 1797	5	1

The

This tree was planted in the year 1748. It is larger than two others planted at the same time, merely because it stands by a rill of water, in a wetter soil.

	Ft.	In.
A Cedar, in the fruit garden, at Loudoun Castle, in Ayrshire, on the 16th of October, 1776, was 30 feet high, and measured	5	7

The Cedar appears not to have been planted any where in Scotland, till after the year 1730. Being a rare and exotic tree, brought from what is supposed to be a warm climate, it has always been placed in gardens, in a dry soil, and a warm exposure. This, however, is a mistaken situation for the tree, and accordingly, in this situation, we never find it of a free growth.

The Cedar is properly an Alpine tree. The country in Syria adjacent to Lebanon, is indeed warm; but the mountain itself is of a great height, and of a very different climate. The Cedars on Lebanon grow on a wet mountain soil, and throughout the year, are exposed to as much frost and snow, as occurs in most parts of Scotland. We therefore find, that the Cedar is never hurt by any frost in this country. But being placed in gardens, and in a dry situation, both with respect to soil and climate, it turns out but a mere bush, compared to that lofty tree, which it naturally is. The four Cedars in Chelsea garden, stood each at the corner of a square pond, in a very wet situation, and were the largest in England. In the low parts of Scotland, the Cedar can scarcely be placed too wet; and will succeed better, on a wet mountain soil, in a Highland wood, than in the best garden in the country.

ULMUS ATINIA.

ENGLISH ELM.

	Ft.	In.
An English Elm, standing in the shrubbery, at Polkemmet, in West Lothian, measured in October, 1799	2	11

This tree was planted in the year 1770, and is about 35 feet high.

Though the English Elm has been immemorially cultivaed in England, and perhaps from the time of the Romans, it is not to be considered as a native of the country. It is evidently that species of Elm mentioned in Pliny*, by the name of Atinia. In England, it is very seldom known to flower, and its seeds are rarely ever seen. It is noted by Pliny, for the same infertility; in consequence of which, the tree was only propagated in Italy, in his time, as it is to this day, in England, by layers and suckers.

Its wood is valuable for many purposes. From its quick growth, and straight stem, it is preferred in England for water pipes. When these are placed at London, in dry gravel, they last thirty years and upwards. But if they are situated in mould, or black soil, they are destroyed by putrefaction, in less than 20 years.——The British navy sails all upon Elm. It is chosen before every other sort of timber, for the keels of large ships. For this purpose, it sells sometimes for 7s. or 8s. the foot; the highest price perhaps, that any timber gives, in the place where it grows.

We have no English Elms in Scotland, of an old date, or of a large size. But those which have been planted, give great encouragement to propagate the

tree

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* Plin. Hist. Nat. lib. xvi. cap. 17.—lib. xvii. cap. 11.

tree plentifully. It grows straight and tall, and much quicker than the Scots Elm, though perhaps inferior in colour, hardness, and durability. But, wherever the two are planted together, it affords a much greater quantity of wood, than the Scots Elm does in the same space of time.

QUERCUS ILEX, Lin.

EVERGREEN OAK.

	Ft.	In.
An Evergreen Oak, at Bargaly, in Galloway, in September, 1780, measured	3	6

It was 50 feet high, with 12 feet of clear trunk, and had many acorns upon it. It is an esculent acorn, and so palatable when ripe, as to find a place at the tables in Spain, in preference to chesnuts[*].

An

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[*] Baron Dillon's Travels. Lond. 1782. p. 304.

	Ft.	In.
An Evergreen Oak, at Loudoun, in Ayrshire. It stands behind the Castle, on the north side, was 30 feet high, and on the 16th of October, 1776, measured······	3	9
Of a row of evergreen Oaks, at Mountstewart, in the Isle of Bute, and to the north of the house, the largest measured on the 1st of September, 1786·············	3	9

The evergreen Oak in our climate, though sufficiently hardy, is a tree of a very slow growth.

PINUS.

THE PINASTER.

In the year 1742, a number of Pinasters were planted at New Posso, in Tweeddale, on the hill behind the house. In November, 1762, several of them were then 25 feet high, and in a thriving state. But one of them being then cut, the wood was found to be of a coarser grain, softer and more spungy, than any Scots Fir of the same age. There is no advantage, therefore, to be expected from the wood of the Pinaster. It is a tree that grows luxuriantly on the sandy beach, upon the western coasts of France. As it is hardy, and grows very bushy, its chief use probably with us, is to obtain shelter on the sea shore.

PRUNUS PADUS, Lin.

THE HAGBERRY.

Ft. In.

In the parterre below the terrace, at the House of Drumlanerig, in Nithsdale, there were two Hagberries growing together.

They were about 40 feet high, and on the 22d of April, 1773, the largest measured ·· 8 0

This tree was fresh and vigorous, and about 70 years old. The red wood of the Hagberry, is of a fine dark colour, and takes a good polish.

SALIX ALBA, LIN.

WHITE WILLOW.

Ft. In.

The largest White, or Huntington Willow, in the Botanic garden, at Edinburgh, measured in June, 1798 ·············· 9 4

It stands on a deep, sandy soil, was planted in the year 1765, and contains a great quantity of wood, to be formed in 33 years.

SALIX

SALIX FRAGILIS, Lin.

CRACK WILLOW.

	Ft.	In.
A crack Willow, on the shore of Lochiel, in Lochaber, measured on the 11th of July, 1771	5	9

It was 35 feet high, with many others nearly of the same dimensions, in the neighbourhood.

SALIX AMERINA.

AMERINE WILLOW.

	Ft.	In.
The foliage of this tree is more agreeable to the eye, than that of most other Willows.		

	Ft.	In.
Willows. But being planted only in a few places, for basket work, it is seldom to be seen of any considerable size. It was planted copiously by the side of the Eden, below the House of Mellerstain, in Berwickshire, where it now makes a very fine appearance. The largest tree, in September, 1795, was 30 feet high, and measured ············	4	10

THUYA OCCIDENTALIS, Lin.

ARBOR VITÆ.

	Ft.	In.
An Arbor Vitæ, at Bargaly, in the Stewartry of Galloway, measured in September, 1780 ···························	5	4

This was probably the oldest and largest tree of the kind in Scotland. It was fresh and healthy, and above 40 feet high, which shews that the Arbor

Vitæ is capable of arriving at the size of a forest tree in this country. Nothing in our climate injures it, and in a wood, or a plantation, it is one of the greatest ornaments in winter. The wood is said to be valuable, but its qualities are scarcely known with us.

FRAXINUS ORNUS, LIN.

THE MANNA ASH.

	Ft.	In.
A MANNA Ash, at Bargaly, in Galloway, two feet above ground, measured in September, 1780	6	9

This beautiful tree was above 50 feet high, had a large spreading head, and seeds upon it nearly ripe, in the beginning of September. Soon after, it was cut down by an ignorant proprietor, and seven feet of the trunk quartered, served for four axles to carts.

The Manna, or Flowering Ash, the Ornus of Virgil, is a native of Italy, but it is as hardy, and grows as freely in this country, as our common Ash. Yet it is so scarce, that there are no trees of it, but what are grafted. It might, no doubt, be raised in plenty and perfection, by seeds brought from abroad. It is one of the handsomest trees when in flower, but we have no experience of the qualities of its timber.

CARPINUS OSTRYA, Lin.

HOP HORNBEAM.

	Ft.	In.
A hop Hornbeam, at Bargaly, in Galloway, measured in September, 1780 ······	4	1

It was about 60 feet high, healthy, and vigorous, with ripe seeds upon it in September. It is the oldest and largest tree of the kind in Scotland, and shews, that the Hop Hornbeam, though a native of the warm provinces of America, is capable of arriving at perfection in this country.

CUPRESSUS DISTICHA, LIN.

DECIDUOUS CYPRESS.

	Ft.	In.
A DECIDUOUS Cypress, in the fruit garden, at Loudoun, in Ayrshire, measured on the 16th of October, 1776	2	4

IT was then about 25 feet high, and 30 years old, and the only considerable tree of the kind in North Britain. It was feathered to the ground with branches, and it is without exception, the most elegant tree in its foliage, that is to be seen in our climate. It used formerly to be kept in greenhouses, which, from this instance, appears quite unnecessary, as the tree had never suffered in winter. It stood well sheltered, and in a heavy clay soil. In a shrubbery, or in pleasure ground, we have no tree equal to it in beauty.

PRUNUS

PRUNUS.

CAROLINA BIRD CHERRY.

Ft. In.

SEVERAL trees of this American Bird Cherry were planted at Hopetoun House, in the year 1747. One of them was cut down in the year 1788, when it measured······ 3 10

This tree afforded a plank of red wood, near a foot broad. The wood is red, finely veined, takes a good polish, and is equal in appearance to mahogany. It is also a very ornamental tree when in flower.

FRUIT TREES.

To the above account of the age, dimensions, and growth of the different Forest trees, a similar account of the Fruit trees may be added, which, if more perfect, might be very useful to their cultivation. The varieties of fruit are well known to differ exceedingly in their qualities, though they all belong to the same species. Some are of great value, while others are not worth being cultivated. But it is not merely in the fruit, that they vary. The trees themselves are widely different in their size, in their manner of growth, their fertility, and their duration. Grafting, inoculation, and other operations in the management of fruit, if judiciously performed, ought therefore, to be regulated by these differences in the trees. For, beside the quality of the fruit, the size, the manner of growth, the fertility, and the duration of the tree on which it is to be placed, ought to be carefully considered. Whatever Apples are grafted on a Paradise stock, or any Pears on a Quince stock, prove diminutive and short-lived trees; compared to what they would be on seedlings, or wildings, raised from the Apple and Pear trees, which are naturally of a large growth, and of long duration.

PYRUS COMMUNIS, LIN.

PEAR TREE.

AT Melrose, in Roxburghshire, in Mr. Riddel's orchard, adjoining to the antient Abbey, which had formerly been the Abbey garden; there are some very large old Fruit trees, which are known to have been planted before the Reformation.

One Pear tree in this orchard, measured in September, 1795, 7 feet 2 inches in circumference; and another ·············· 7 6

They are of that sort of early yellow Pear, called the Golden Knap. They have evidently been grafted trees, and still continue to bear plentifully.

Another Pear tree in that orchard, and of the same kind, had been lately cut, which measured ························ 8 10

Almost the whole of this large trunk consisted of red wood, and was perfectly sound.

Ft. In.

A Pear tree, at Restalrig, near Edinburgh, 2½ feet high, before it begins to branch, measured on the 16th of July, 1799 12 0

It stands in a garden, adjacent to what was the house of Albert Logan, of Restalrig, who was attainted in the reign of James VI. and the tree was probably planted before his forfeiture. It is the Golden Knap, the same sort of Pear with that of the above trees at Melrose. It is to this day, a vigorous tree, and generally bears a good crop.

The Pear is capable of forming a large timber tree, and the wood is valuable. Exclusive of its beauty, while in blossom, and its usefulness as a fruit, it deserves its place in plantations, as a forest tree. For this purpose, it is to be raised from seeds, and planted out without being grafted; for these wildings, as they are called, form the most vigorous and the largest trees. Their fruit also, though often scarcely eatable, is useful in the making of perry.

As this Golden Knap forms the largest and most durable tree, of any Pear we have, and has been long inured to the climate, its seeds are therefore to be preferred, for the purpose of plantation. The wildings raised from them, are, for the same reasons, to be chosen as stocks for grafting, in preference to many other sorts of Pears.

PYRUS MALUS, LIN.

THE APPLE TREE.

	Ft.	In.
AN Apple tree, in a garden, at Jedburgh, in Tiviotdale, measured in June, 1763, three feet above ground	7	2

The spread of its branches, was above 40 feet in diameter, and in the year 1762, it bore eight bolls of Apples, Linlithgow measure.

At Lethington, in East Lothian, the three original trees of the Grey Ledington, or Lethington, still remain, from which all the other apples of that sort in Scotland, have been propagated. The trees are of the largest size of any Apple trees in the country, and though very old, are still vigorous, and generally afford a great crop. They stand in a very deep, moist, clay soil. They may, probably, as it is alledged, be as old as the time of Secretary Lethington.——From the reasons mentioned above, it appears

pears therefore, that the Lethington is the best, or one of the best Apples we have, to produce free stocks for grafting.

PRUNUS ARMENIACA, Lin.

THE APRICOT.

	Ft.	In.
An Apricot, on a wall at Lethington, in East Lothian, measured on the 26th of October, 1785	3	2

This tree was reckoned to be above 100 years old, and was still fruitful.

An Apricot, on a very high wall, at Prestonfield, near Edinburgh, planted in the year 1670, grew to a great size, and was for above 100 years, extremely productive, but some of its largest arms have of late decayed away.

An Apricot, on a high wall of the Castle, at Branspeth, in the Bishoprick of Durham, was many years ago, 30 feet high, and forty-four feet in breadth *.

The Apricot certainly continues fruitful, and in perfection, above a century; and probably would be more fruitful, and longer lived, if it had room to grow. It is naturally a large tree, and requires much more space, than a wall of 10 or 12 feet high can afford.

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* Lawrence's New Syst. of Agriculture, fol. p. 351.

PRUNUS,

PRUNUS, Lin.

THE GEEN.

	Ft.	In.
A GEEN tree, in the orchard, at the Holm, in Galloway, near Dumfries, measured on the 20th of October, 1763	5	6

It was above 50 feet high, and the spread of its branches, 33 feet in diameter. It is frequent in the natural woods in that country, when it is observable, that the tree always decays, whenever its roots extend to water.

The excellent qualities of the wood, render the Geen one of the most profitable forest trees.

PRUNUS.

PRUNUS, LIN,

WHITE HEART CHERRY,

	Ft.	In.
A WHITE Heart Cherry, in the orchard, at Cames in the Isle of Bute, measured in September, 1771	5	10

It was about 70 years old, and above 50 feet high.

II.

NATURAL HISTORY

OF THE

INHABITANTS

OF THE

HIGHLANDS.

WE have the histories of many countries, written by different naturalists, upon different plans, and with very different talents; but in them all, the first object of nature, which is Man himself, has been too much neglected. For, though the naturalist claims not the extensive study of human nature, and human manners, as a part of his science; yet the natural history of a country can be reckoned but incomplete, if it does not exhibit the most remarkable phœnomena, and all the striking peculiarities, to be observed among its inhabitants.

The people who are the subject of the following pages, make one of the few nations in Europe, who are the aborigines of the country in which they live. No history nor tradition inform us of its ever having been possessed by any other inhabitants. Derived from the Celtæ, the original natives of western Europe, they are now the only remains of that memorable people, which have continued unconquered, and unmixed with other nations. Their remote situation, and the inaccessible nature of their country, preserved them from conquest in former times, and the same causes have still preserved them as a distinct people, even from the rest of their fellow subjects. A nation thus detached from all others, for so many ages, must of course, be strongly marked with many peculiar characters, and to delineate these, is the principal design of the following observations.

What is here delivered, concerning the inhabitants of the Hebrides, may be considered as applicable to all the other Highlanders, who live within the boundary marked by the Galic language. They originally were, and still continue to be, the same people. For, though they occupy various countries, which extend for above three hundred miles, on the north west coast of Britain, and are widely different from all other British subjects; yet, they nowhere differ so much among themselves, as the people of one county in England, or the South of Scotland, do from those of another.

SECT.

SECT. I.

ACCOUNT OF THEIR PERSONS.

STATURE.

THERE is a remarkable difference in stature, to be observed among the different ranks of people, in the Highlands. The gentlemen are in general, tall and athletic; but the commons, though well made, and robust, are but a middle sized, and meagre people. Strong indeed, in proportion to their size, and their strength of body is still exceeded, by their strength of constitution. As for corpulency, it is a thing utterly unknown among them.

The reverse of this, is usually the case, in nations highly refined. There, the persons of the lowest size, are commonly those of the highest rank.

But the commonalty in the Highlands, have not yet reached that manner of living, necetsary to raise them in size, above their superiors. Nor have the people of station yet arrived at those arts of life, which extenuate posterity.

They are all strongly prepossessed with a high opinion, of the stature and strength of their remote ancestors. But this indeed, is common to most nations, especially those who have signalized themselves by a warlike spirit. Mankind, every where, connect vast strength of body, with the ideas they receive of great martial atchievements. And hence, Fingal, and his heroes, are considered by their posterity, as perfect giants; while they view themselves, as the sons of feeble men.

Many traditions still remain, which rivet them in the opinion of the great bodily prowess, even of their more late ancestors. It is commonly received, that with the old two handed sword, the four legs of a horse were frequently cut through, at a stroke. This intimates such a degree of strength, as they themselves are unaquainted with at present. And indeed, without more authentic vouchers, the presumption concerning their stature, lies on the other side: that if they are altered at all, they are rather improved, as their diet exceeds that of former times; and, that this improvement must advance, as they are not yet arrived at that fulness of living, which is necessary to raise the human body, in our climate, to its largest size.

The stature of man, in most places, keeps pace with that of the domestic animals. Both depend upon the sustenance afforded by the country, and this again, on the soil and climate. The observation holds in the Highlands of Scotland, and is to be traced also in England, Ireland, France, and other countries. Nay, it is to be discerned, even, in some of the contiguous districts of Britain. In the South of Scotland, there is an extensive alpine country, formed by the mountains of Clydesdale, Nithsdale, Tweeddale, Annandale, and the forest of Selkirk. In this extensive tract, where a rigorous climate, is attended with scarcity of pasturage, and also of corn and fewel, the inhabitants are of a low stature, and the domestic animals small in proportion. But, upon descending from this district, into the adjacent and lower countries of Douglasdale, and Evandale, the traveller in three hours, observes a remarkable alteration in the face of the earth, and an alteration no less remarkable, in the bulk of the inhabitants, and of all their cattle. These countries enjoy a milder climate, abound in corn and pasture, and possess plenty of coal; an article, which suggests another reason, why the inhabitants are of a larger size than their neighbours, who enjoy not that advantage. For, there are not wanting facts, to support this observation; that a certain degree of heat is necessary to enlarge the human stature, as well as a certain degree of food.

COMPLEXION.

It is by slow degrees, that a considerable alteration of aspect is produced in any race of men; and to remove it, seems to require an equal, if not a greater length of time. It is a process in which nature slowly operates, and ages seem requisite to perform the task. The Celtic and Saxon blood are still to be traced, in the complexion and features of the different inhabitants of Britain. And we have an instance of the same nature, in the Western Islands. There, the general complexion is black; many indeed, are of a dark brown; but there is a greater proportion of people with red hair, than any where else in these kingdoms. By universal tradition, and we may trust a little to tradition in this matter, these last are not of genuine Celtic origin, but descendents of the Norwegians, who always were, and still are remarkable, for the red complexion; and whose posterity, it seems, still retain it, though mixed, for at least six or seven hundred years, with a different people.

VISAGE.

The persons of condition over the Highlands in general, are remarkably well looked; but with a cast of countenance peculiar to themselves, which is still more strongly marked, and more striking, in the lower ranks. The people of the South, know so much of this peculiarity, as to have an idea of what is called the Highland face. But, though it may be known, when seen; it is not so easy to say, in what it consists. Its most distinguishing character, seems to be a prominency in the cheek and jaw bone, and it frequently gives a very manly and agreeable visage. But among the lower people, this is generally attended with contracted eye-brows, other strong features, and hardness of complexion, which altogether, form great severity of countenance.

The lineaments of the human face are always of a coarser form, among the pastoral inhabitants of a mountanous country, than among the people who inhabit the plains, and are employed in agriculture; or who dwell in towns, and manufacturing places. In the former case, the people live more abroad, and are constantly exposed to the inclemencies of the weather, in a more severe climate; to the glare and heat of the sun, violent winds, tempestuous rains, drifting snow, and intense cold. These are things which wring the human countenance, and throw it into many bold and uncouth figures; which by frequent repetition settle upon the features. This roughness of visage, created by mere roughness of weather, descends upon the offspring. And hence, the rudeness of the climate passes into the aspect of the inhabitants.

Having occasion to visit the schools supported at the public expence, where great numbers of the children of the lower people are collected, I could not help being surprised at the great difference in their looks, compared with those of their parents. Their features indeed, though agreeable, are stronger than those of children in the south; but their complexion is as fine as any in the world. Yet, when they grow up, this comes to be entirely obliterated by exposure to the weather, and the smoke of their houses. The men indeed, gain an iron complexion, and a more warlike aspect: but it is a rarity to find a woman of middle age, with tolerable looks.

The case is very different, however, with those of high rank, who are in general handsome, both in face and figure; and appear almost like a different race from their inferiors. They live indeed, at a more plentiful table, nor are they so much exposed to smoke, and the severities of the weather. But both their stature and looks are still more preserved, by their marrying early in life, and that generally, from attachment to a handsome person; the natural consequences of that state of society in which they are placed.

We need not then be so much surprised, at the various aspect of nations, situated in distant regions, and very different climates; when from causes like these flow such palpable distinctions, among people of the same blood, and living in the same country.

GESTURE.

Being rather grave than volatile in their temper, they speak commonly with little or no gesticulation. But, when by any means, they happen to be roused, their gestures become quick, vigorous, and very expressive of their sentiments and intentions.

All the commons are remarkable for walking with their toes inwards; which is probably the case with all mankind, in the early and unpolished state. It seems to be an attitude pointed out by nature. We can take a firmer hold of the ground, with our toes, than with our heel, and to do this, they must be inclined inwards. This position of the feet, gives the greatest force to every effort of the human body, and must therefore be an instinctive habit. To turn out the toes, is a custom, which cannot appear, till it becomes the instruction of art; and till gracefulness of attitude comes to be in greater request than strength. This seems to have been well known, and was carefully observed by the ancient sculptors. In the Farnese Hercules, where strength was the great object of the artist, the toes are inwards. In the Belvidere Apollo, where grace only is considered, the toes are outwards. So that it is neither nature nor conveniency, but the dancing school, which preserves us all from walking in the manner of savages.

They are no less remarkable for walking with bended knees; which is not, like the former case, the effect of nature, but occasioned by the country they live in. It is a custom which must be prevalent, with all who live in rough and mountanous regions, where almost every step they travel, is an ascent or descent, of considerable height. In both cases, nature suggests the bending of the knee, and by constant use, it becomes habitual. By this appearance, the mountaineer may be any where easily distinguished, from the native of the plain. For, the latter either walks with his limbs straight, or by forcing his knees backwards, has his gait unnaturally altered, and converted into a strut.

LONGEVITY.

The Hebridians have been noted, for being extremely long lived. But upon particular enquiry, they appear not to be highly remarkable in this article. Such of them as arrive at a very great age, are much observed; and in a country so remote, and so thinly peopled, their memory subsists fresh, even for centuries, over all the neighbourhood. In this way, you have accounts given of all the people, who have been remarkably old, for some ages back. Their number consequently will appear greater, than in populous and busy countries; where events, if not consigned to history, are soon lost by tradition; and where the memory of people, only remarkable for their age, rarely survives the second or third generation.

Many obstacles lie in the way, to prevent their arriving at a very advanced age. Their diet is prejudicial; being either too low, or consisting too much of animal food and salted meat. Their immoderate use of spirituous liquors, is no less noxious. And neither their cloathing nor their houses, defend them sufficiently from the rigours of the climate. They are not indeed worn out by labour; but they are as much impaired by the severities of cold and wet; by their hardships at sea, and by the care of their cattle, on the mountains, in winter. These causes, indeed, create great hardiness; but they are likewise the causes of many diseases, and of gradual decay; nor will that hardiness lengthen out life to the extremity of age, where these causes continue to operate.

The greatest proportion of old age will always be found in those classes of mankind, who undergo no violent vicissitudes of weather; no immoderate fatigues either of body or mind; who live well, but who live temperately; who are placed by their circumstances above labour, but not within reach of the hurtful luxuries of life. This description, however, is applicable to few of the islanders, and, consequently, we are not to expect among them that longevity, to be found in more plentiful countries, and milder climates.

It is neither in the hot nor cold, but in the temperate regions of the earth, that the thread of human life, among the inhabitants in general, is drawn out to its utmost length. Such is Madeira, where, it would appear, there is less mortality, and more longevity, than any where else on the globe. There seems, indeed, to be something in islands friendly to the prolongation of life.

The Hebridians, though inferior, probably, to the people of more southern climates, yet appear to equal, if not exceed in longevity, the inhabitants of any other country, in the same latitude. Reports are frequent of persons among them, who have lived to 100, to 120, and even to 130 years of age. But it is difficult, indeed almost impossible, to get such reports sufficiently authenticated. In the year 1764, there were but three persons, in all the islands north of Cantire, who were above a hundred. One woman of 102, and a man and a woman, each 103 years old. The women in general, are longer lived than the men: but this seems to be the case in most countries. In all the people of advanced life, there is more vigour to be observed than in persons of the same age, in the south of Scotland, or in England. They have fewer of the marks of old age; fewer grey hairs, better teeth, and less baldness. None are to be seen above 80, who are not remarkable for a vivacity, which surprises the spectator. But upon reflection, it is natural to expect it. For they who arrive at that high period of life, must have known little of chronical diseases, and are the persons who are formed by nature, with the soundest habits of body, and the best spirits.

The Outlines of the History of Life and Death, first projected by the great Verulam, have in several parts been filled up by succeeding philosophers; but many considerable blank spaces still remain.

We

We know not yet, the precise quantity of longevity, in any European nation. From the data afforded by bills of mortality, calculations have been formed of the chances of life, and the comparative degrees of health, in different towns and countries. But the fixed quantity of longevity, in any given number of inhabitants, has never been attempted by actual experiment. To determine this properly, it would be necessary to have the inhabitants numbered to a man, and the age of every individual specified. But there are few who have the proper opportunity, and still fewer, who, to obtain a single fact of this nature, would submit to the drudgery of such an operation.

After having the number of people exactly ascertained in several of the islands, I was at pains to have the number of persons in each, who were of a very advanced age, likewise determined. This, I imagined to be the next best method, of fixing the true proportion of longevity. In these instances, the result of the enquiry turned out, at an average and in round numbers as follows:

Every 12th person was found to be 60 years of age, or upwards, which appears indeed to be a very great proportion. Among each 100 inhabitants, there was one person of 80 or upwards. But only one person of 90 years old, or above it, among 500 people. Some instances exceeded, others fell short of this calculation; but in general, it may be assumed as the proportion of longevity in these islands. Only three persons were found, as mentioned above, of one hundred years old and upwards, in all the islands.

These facts ascertain only the absolute quantity of longevity. For, without a comparison with other places, we cannot say with certainty, even from these facts, whether the Hebrideans are remarkable for being long lived, or otherwise. Their comparative longevity, therefore, cannot be determined; but it will appear, when the same observations come to be made in other countries.

DISEASES.

There is one presumption, however, in favour of their being comparatively long lived: that they appear to possess a greater quantity of health, and to be subject to fewer diseases than most other nations. The diseases which make any considerable havock among them, are extremely few, and there is not only a number of maladies, but even entire tribes of diseases, from which they are entirely exempted.

The list of diseases is now become frightful. It is but of late, that the fable of Pandora's box seems to have been realized. There are now ascertained, 560 different distempers, to which the human frame is liable. And even when these are enumerated, we may still venture to say, that the one half is not told. Some great physicians have of late, and for the first time, reduced diseases to a regular system, and marked their generical characters with perspicuity and accuracy; but when the same genius and precision come to be extended to the species and varieties of distempers, the sum total will be found greatly to exceed the number here suspected.

This overgrown and dismal catalogue, is chiefly swelled by the influence of high polished manners. The one half of it, can hardly be considered as the diseases of nature, but of artificial life. No such catalogue could be made up among the inhabitants of the Hebrides, whose chief chronical disease is old age, and the inevitable decay of nature; but as they proceed in the usual progress of society, their maladies must multiply. For great as the catalogue of diseases already is, it must continue to increase, as the European nations advance in the refinements of luxury; and as the increasing communication with the remote parts of the globe, may introduce both the knowledge and experience of new distempers.

The most prevalent chronical disorders among the islanders, are rheumatism and scurvy. The one, the effect of their climate; the other, of their diet. The jaundice also is pretty frequent. But these, and their other chronical diseases, bear a small proportion to those which are acute. This seems to be the case every where, in the early stages of society. But in improved countries, and in populous cities, the chronical appear to increase more in proportion, than the acute diseases. The bills of mortality, indeed, sometimes say otherwise. But if the reports were made by a physician, instead of a grave digger, they would probably be stated in a different manner.

The most common acute diseases are continued fevers, pleurisies, diarrhœa, and quincy. A spotted fever, also the Scarlatina of Cullen springs up at certain periods in some of the islands, without any foreign communication that is observed, and instantly becomes very contagious and mortal.

But the most hurtful of all their diseases, are the chincough, measles, and small pox; especially the last, which has often occasioned a mortality scarcely to be exceeded. The number which falls by these three epidemics, is little, if at all inferior, to what is cut off by all other diseases.

To compensate for these, they know nothing of the ague, scrophula, or barrenness. Nothing of dropsy, tympany, or ruptures. They have few consumptions; no gout; very little of the stone; and so far as can be learnt, were never visited by the plague [*].

The health of the people in general, has been considerably improved within thirty years past; by an alteration which has taken place, during that period, in their manner of living. This has been occasioned by an increase in the quantity of grain, the introduction of garden stuff, and especially by the culture of potatoes. By these means, their vegetable aliment has been greatly enlarged; and those cutaneous diseases considerably retrenched, to which the northern nations are so obnoxious, from an over proportion of animal food, and salted meat.

MADNESS.

Deformity scarce ever occurs among the Highlanders. They come into the world without any natural imbecillity either of body or of mind. Their country produces no dwarfs; and what is more singular, neither fools nor madmen.

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[*] The Elephantiasis, Frambœsia, Tinea, and some other diseases, which are either rare, or very peculiar to the Hebrides, are each of them considered at more length, in my description of those islands, where they are particularly prevalent.

They know little of that formidable class of diseases, which are either seated in the nerves, or which affect these strings of life, in a violent manner. They are seldom, if ever, subject to epilepsy, palsy, lethargy, or apoplexy; and are equally free from melancholy and frenzy. From these diseases, they seem to be peculiarly exempted, by their climate, and manner of life. For these dismal appearances in our nature, are only frequent, in proportion as the human frame is enervated by luxury, or the heat of the climate.

In the colder countries, mankind are found phlegmatic in their habit of body; and in their dispositions, dispassionate, patient, steady, and persevering. In the warmer regions of the earth, they are more subject to inflammatory distempers, and more liable likewise to inflammation of mind. More passionate, impatient, desultory, and capricious. More liable to those sudden and violent vicissitudes of high and low spirits, which unhinge the mind, and slide, by an easy transition, into lunacy and madness.

But effeminacy and intemperance, in whatever climate they prevail, are productive of the same effects. The life of luxury is not the natural life of man; nor the state to behold his faculties, either of body or mind, in their greatest perfection. As it enervates the powers of both, it renders the body more obnoxious to disease, and the mind to degeneracy. In every highly polished and luxurious state, the number of physicians proves the one, and the number of mad-houses, the other.

The inferior animals, who lead no such artificial life, are never known to be either maniacs or ideots. Their instinct, indeed, seems not to be so precarious a possession as human reason. And we have too many deplorable instances, where, after the reason of the man is gone, the instinct of the animal remains. Yet, wherever mankind approach nearest to that life which nature points out, there, the human mind is unquestionably less liable to those melancholy casualties, to which it is so obnoxious in the more mature, perhaps, the more decayed æras of society.

III.

HISTORY

OF THE

ISLAND OF ICOLUMBKIL.

Situation.—THE island of Icolumbkil is situated at the south-west extremity of the isle of Mull, and distant about thirty computed miles from the nearest part of the main-land, which is the country of Morven. It is separated from Mull by a narrow sound, about half a mile over, and three miles in length. In this strait, there is depth of water sufficient for any vessel, and ships of war have sometimes passed through it: but the narrowness of its channel, and the sunk rocks with which it is embarrassed, render it a very dangerous passage.

Name.—This small island has been famous 1200 years, for having been the residence of Columba, the person who first propagated the knowledge of

Christianity in the most northern parts of Britain: But it has been known by several different names.

It was first called by the name of Y, that is, by way Eminence, the Island, which is the meaning of that letter in the ancient language. This name it seems to have acquired upon Columba's arrival, and is so written in some of the old inscriptions that are yet extant upon the island. This name is still expressed, in the Gaelic language, by the asperated sound of the single letter, which is the same with the names of Hy and Hii, given by Bede and other authors. Its ancient Latin name was Iona, being thus termed by Adamnanus, the most early writer we have concerning it: and it is so styled on some of the monuments in the island, erected but a little before the Reformation. By some of the old Irish and Danish writers, however, it is called the Insula Sancta, or Holy Island.

It has always been known likewise, in the Gaelic, by the name of I-collum-cille, from whence, the English word Icolumbkil is derived. This word consists of the ancient name of the island prefixed to Collum-cille, which is Cella-Columbæ, the whole signifying the island of the cell of Columba. Most of the religious houses in Scotland derived their origin and splendour from their having been the cell or residence of some solitary monk, famed for sanctity, when the Gaelic language was the language of the whole country. And hence, in the names of so many of them, we find the Gaelic word kil or cella, prefixed to the name of the person whose cell it was; as Kilpatrick, Kilriny, Kilmarnock; Cella Patricii, Niniani, Marnoci.

The people of the country derive the name of Iona, from Y-iona, the island of John, or of St. John, who had particular honour paid him in these parts, during the popish times. But the name of Columba is observed by his successor and historian, Adamnanus, to signify the same thing in Latin, that is, a dove, which the word Peristera stands for in Greek, and which the word Iohna expresses in Hebrew. And in these remote monkish times, it is not unlikely, that from this conceit, the name of Iona was derived.

Dimensions.—The island extends in length about three computed miles, in the direction of the opposite coast of Mull, and of the sound that runs between them. It is near two miles over where broadest, and belongs in property to the duke of Argyll.

Hills.—It contains no mountain, but is full of small hills. The highest, which does not exceed 400 feet above the level of the sea, and the boldest shore, lies upon the south-west side. The ridges of these hills run in the direction of the length of the island

island, and shoot out, at its extremities, into many small rocky heads, which form a number of rugged inaccessible creeks. But the coast along the two sides of the islands lies more in a streight line. It forms in most places, a low sandy beach; and, where it is interrupted with rock, the rocks do not shoot out into the sea, as at the extremities of the island, but run along shore.

Harbour.—There is properly no harbour belonging to the island; but, in a small sandy bay, below the ancient abbey, we found very good anchoring ground, in five fathoms water, within two cables length of the shore. There is another landing place for boats, but a very dangerous one, except in quiet weather, upon the south-west part of the island. It is a creek, lined with perpendicular rocks of serpentine marble, and fully exposed to the western swell. It was here that Columba first landed from Ireland, and the place has ever since had the name of Port-i-curach, that is, the Harbour of the Boat, by way of distinction. The word curach, signifies that sort of boat, which the ancient Irish and Caledonians constructed with ribs of wood, and covered with skins. And such, it seems, was the structure of the vessel in which Columba made his voyage from Ireland.

Springs.—The island is supplied with plenty of the finest springs, and though they are very small, yet a number of them collected, form a pleasant rivulet that runs past the ruins of the ancient nunnery. There is no standing water upon any part of the island, but on a plain adjoining the gardens of the abbey, and surrounded by small hills, there are vestiges of a large piece of artificial water, which has consisted of several acres, and been contrived both for pleasure and utility: Its banks have been formed by art into walks, and though now a bog, you may perceive the remains of a broad green terrace passing through the middle of it, which has been raised considerably above the water. At the place where it had been dammed up, and where there are the marks of a sluice, the ruins of a mill are still to be seen, which served the inhabitants for grinding their corn. Pleasure grounds of this kind, and a method of dressing grain, still unpractised in these remote islands, must no doubt have been considered, in such early times, as matters of very high refinement.

Contents.—Icolumbkil seems to contain about 3840 English statute acres, of which, a large proportion, perhaps 2500, have at some period or other been cultivated. There may be still about 500 capable of being reduced to culture, comprehending some tracts of heathy soil, and of sandy downs on the sea shore. The remaining 840 acres, may be the amount of the irreclaimable part, which consists of the rocky summits of the hills, the steep declivities, and the blowing sand on the sea shore.

Soil.—A light sandy soil prevails over the whole island, which in some places, however, is very fertile. Upon the sea shore, especially, there are some small plains, exceedingly pleasant, that afford good crops of bear and oats. The hills are covered with a fine verdure, and afford a very rich dry pasture for black cattle and sheep. Some of the hills are arable to the top, but those on the south end of the island are over-run with heath; yet the small valleys interspersed among them, are filled with grass of the finest quality.

Climate.—Being detatched from any considerable tract of land, and surrounded by the ocean, this small island enjoys a very temperate climate, remote from the extremes both of heat and cold. It is but seldom, in a winter, that the freezing degree takes place; and if there happens to be a little snow, which is a rare thing, by the lowness of the land, by the warmth of the ocean, and of the sandy soil, it is quickly dissolved. As in all other islands, however, of the like situation, the winter is comparatively warmer than the summer: The worst part of the climate proceeds from winds and rains, which are very frequent and heavy all the year round; and produce a great deal of broken weather, even in the midst of summer. In this season, therefore, the heat is always less here, though it is greater in winter than in any part of the island of Britain: And, for the same reasons, the same observation holds with respect to Britain, when compared with the European continent. During summer, however, there are intervals here of very fine weather, and of considerable warmth. Upon the second and third of July, Fahrenheit's thermometer stood here at mid-day in the shade, at 67 the one day, and at 69 the other; and each night, in our tent, it stood at 66 at midnight, being hung in a free air between the tent and marqué.

The heat of the summer, with the warm nature of the soil, proves sufficient to produce more early crops than in most parts of Britain: For though the people are very late in sowing their grain, they have always harvest early in August.

The writer of Columba's life relates*, that the old man, having ordered a quantity of bear to be given to a person in compensation for a damage he had sustained, he ordered him at the same time to sow it, though it was then about mid-summer, assuring him, contrary to his expectation, that he would, the same season, reap from it a plentiful harvest. In obedience to this mandate, the man committed the grain to the soil on the 12th of June, and reaped a crop from it in the beginning of August.

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* Adamnan. vit. Columb. Lib. II. cap. 2.

gust. The fact is not surprising to have happened here, though it is regarded by the author with admiration, and recorded as one of Columba's miracles.

INHABITANTS.

Number.—The present number of people upon Icolumbkil amounts to about 200, so that the island contains 19 acres for each inhabitant; but in the year 1688, when it was visited by Mr Sacheverel, then governor of the Isle of Man, he found upon it eighty families*. These, at six persons to each family, which is the nearest computation for the Highlands, amounted to 480 persons, which is more than double their present number. This great diminution of the people, which unhappily is not confined to this spot, but is general over all the adjacent parts, has been caused by the great consumption of the men in frequent wars, and a constant emigration, both of men and women, to Ireland and other countries.

Religion.—The island belongs to the parish of Ross in Mull; but the minister's residence is so distant, that they are quite cut off from his instructions, unless when he visits their island, which can happen but seldom, because of the vast extent of his parish. They are all professed protestants; but being entirely destitute of the means of knowledge, and having no school, they are left in such a state of ignorance, as, in a christian country, is really deplorable; for, of the 200 inhabitants, there is not one who can either speak English or read the scriptures; though their little island was, for many centuries, one of the chief seats of religion and learning in Britain.

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* Sacheverell's Account of the Isle of Man, Lond. 1702. p. 143.

They are all of the lowest rank, under a gentleman of the name of Campbell, who rents the island; but they are a civil and inoffensive people. They live apparently in great poverty, and yet are happy in having wherewith to supply all the wants they are acquainted with. Entirely excluded from all intercourse with the rest of mankind, they enjoy the mere necessaries of life with peace and contentment, and have always been remarked as being of a soft and gentle disposition.

Superstition.—They have all of them a remarkable propensity to whatever is marvellous Every person has the traditional history of Columba, with numberless legends, which have been handed down from his monkish seminary. They are famous for the second sight; full of visions seen either by themselves or others; and have many wild and romantic notions concerning religion and invisible things. Though they know not what popery is, the vestiges of it they suck in with their milk, which appear in many of their opinions and practices. Having no opportunity of public worship above three or four times a year, when visited by their minister; it is their custom to repair on the Sabbath to their devotions in the ruinous Abbey, to Columba's tomb, and the chapels of several different saints.

Their regard is so great for these ancient monuments, that it has always been the custom, before any person was buried in Icolumbkil, to carry the corpse with great reverence round the whole buildings, which occupy a great space of ground. This practice was for the first time abolished, but a little before I was there, by the Rev. Mr Neil Macleod, their present minister. Having accompanied a funeral from the Isle of Mull, he insisted with great resolution, for it required not a little, that the corpse should be interred without this previous superstitious ceremony.

It is not at all surprising, however, that the inhabitants of Iona should be remarkable for superstition beyond their neighbours. Where are mankind otherwise in a state of ignorance, solitude, and inactivity? But, besides these general causes, there are others more peculiar to their situation. They are a people whose imagination is evidently the most lively of all their faculties. The huge fabric of artificial superstition, erected on the spot in which they live, has rendered the very air of their island infectious. Their unlimited veneration for antiquity supplies the place of truth in the most marvellous and frightful legends; and their slender acquaintance with religion is but the parent of that superstition, which can only be remedied by a more perfect knowledge of divine things.

ANTIQUITIES.

Columba.—By all accounts, the famous Columba first arrived at Icolumbkil, accompanied by a considerable number of other priests, in or about the year 564, and in the forty-second year of his age. He had been the disciple of St. Patrick; was of royal extraction, being grandson to the supreme monarch of Ireland; and, by his near alliance to the kings of Ireland and Scotland, with the authority of his character, possessed great power and influence in both kingdoms.

Adamnanus.—The most authentic history that remains of him, is his life written by Adamnanus, the preceptor to Eugenius the VI [*], who was himself abbot of Iona in the year 665, being the fourth abbot in succession from Columba, and that, only sixty-seven years after his death. This work was first published by Canisius, from a MS. preserved in a monastery in Bavaria, and since republished by Basnage, in his Thesaurus Monumentorum Ecclesiasticorum. This author is mentioned by Bede, and allowed to be authentic by Usser: And, indeed, the language, and the whole matter and manner of his relation, give no intimation of its being of a more modern date. Wherever he is led to mention the topography of Icolumbkil, or that of the adjacent islands, he speaks with the accuracy of a person who had lived in it; and the truth of his descriptions may be traced in some of the monuments that are still extant upon the island.

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[*] Lesslie, De Moribis et Gestis Scotorum, p. 163.

Picts.—Columba abandoned Ireland, it would appear, on account of some violent commotions which had arisen in that country; and, being zealous to the highest degree in the propagation of christianity, formed a design of converting the Picts, who then inhabited some of the most northern parts of Scotland. Soon after his settlement in Iona, in the reign of their king Brudeus, he made a journey into the Pictish territories, into some parts of Inverness-shire *, and preached to them the gospel, to which, they had hitherto been entire strangers. His historian calls them gentiles barbari, barbarous heathens, but that upon seeing Columba's works, they glorified the God of the christians. He likewise observes, that Columba preached to them by an interpreter [†]; which is a curious fact with respect to the dubious origin of that memorable people. It argues their language to have been different from the ancient British, which was the language of Columba, and they themselves of some other original.

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* Adamnan. vit. Columb. Lib. II. cap. xix.

Archbishop Usser supposes the Picts and Caledonians to have been the same people [‡]. Cambden, and other great antiquaries of the present, as well as of former times, consider the Picts only as the remote part of the uncivilized unreduced Britons; but Bishop Stillingfleet seems rather to be better founded in thinking them a separate nation [§].

The Britons, in the days of Columba, appear to have had no occasion for an interpreter with the Irish and Scots. Their language could not then be so different; it was originally the same; and, though since divided into the dialects of Bretoon, Cornish,

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[†] Adamnan. vit. Columb. Lib. II. cap. xx.

[‡] Usser de Brit. Eccles. Prim. p. 586.

[§] Stillingfleet's Antiq. of the Brit. Churches, Chap. V. p. 241.

Welsh, Manks, Irish, and Gaelic, and greatly altered by distance of place and length of time; yet the natives of the six countries can even go near to understand one another to this day, without an interpreter. Does not this strongly insinuate that the language of the Picts was different from any dialect of the British, and they themselves, a separate, perhaps a Scandinavian race?

Armagh.—From Columba's history, we are directed to the origin and etymology of the primacy of Armagh in Ireland. Adamnanus makes frequent mention of a monastery founded in Ireland by Columba, before he came into Scotland, by the name of the Monasterium Roboreti Campi, the Monastery of the Oak Field; and, upon several occasions, describes the anxiety which Columba entertained for its success and prosperity. What place in Ireland is meant by this name, I could not learn, till looking into Bede, I found he observes concerning the metropolitan seat in Ireland, that it was called, in the language of the Scots, De Armach, or Field of Oaks *. This is but a slight alteration from the present Gaelic orthography, of the word signifying an oak wood, which is Darrach. The Monasterium Roboretum of Adamnanus, is plainly the Latin translation of this word, and, no doubt, the same place with the present Armagh.

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* Bede, Lib. III. cap. iv.

Aidanus, the lineal heir of the crown of Scotland, was brought out of Ireland by Columba in the reign of Kinnatellus, at whose death he was installed king of Scots by Columba, in the island of Iona, which, from this time, became the usual burying place of the kings of Scotland, down to the reign of Malcolm Canmore. The extraordinary veneration in which Columba seems justly to have been held, and his high reputation for sanctity, were communicated to his island; so that a sepulchre in it became generally coveted by the great families in Scotland, and even by the grandees of Norway and Ireland.

Columba's institution, by these means, was soon richly endowed, and became the first, as it was for several ages, the only university in this part of the world. Being famed for all the philosophy and theology of the times, and for the severe manners and discipline of its founder, which were long kept up, it became a general place of education, not only for the Scots, but for the British and Irish churches.

Among the honours bestowed by the kings of Scotland on the abbey of Iona, we find the rise of a custom which has continued ever since: the dedication of the trophies of war as ornaments, though very strange ones surely, to christian churches. After the signal victory which Aidan gained over the Picts and Saxons, he sent the banners of his vanquished enemies to Columba, to be preserved in his abbey. Kenneth Macalpine, also, after the final overthrow of the Picts, devoted the sword and armour of Dunstrenus, the Pictish monarch, to the church of Iona; the victory obtained by Aidan being at the time entirely ascribed to the prayers of Columba. It is not unlikely, that the spoils of war were first introduced into monasteries, from the persuasion of supernatural assistance acquired from the prayers of their pious inhabitants; and so these trophies came to be devoted as monuments of gratitude as well as of glory. From whatever motives the custom may have been continued, it is certain, that the preservation of the monuments of victory must be useful to a nation, though it may still be doubted if churches are the most proper places for their reception.

Abbot.—Among the many extensive privileges granted to the abbey of Iona, the jurisdiction of its abbot was very remarkable. The venerable Bede informs us, that, in his time, the abbot of Hy had a sort of supreme government over all the other monasteries in Britain and Ireland, which had been propagated from that seminary. And though never more than a presbyter, had, notwithstanding, a jurisdiction over the whole province, to which, even the bishops themselves were subjected, after an unusual order, Ordine inusitato, as Bede expresses it*.

This uncommon privilege vested in the abbot of Iona, it is not unlikely, might be the very first instance of the abbates exempti, who were afterwards so frequent in the popish church: when the abbots or heads of monasteries, by the papal power, were often rendered independent of the bishops, and exempted from their jurisdiction. The head of the monastery of Iona became afterwards a mitred abbot; not only subject to no diocesan, but invested with the mitre, crosier, and other ensigns of the episcopal office. But the precise limits between his power and jurisdiction, and that of the bishop of the isles, it is not very easy at this time, if at all possible, to define.

Culdees.—For several centuries the inhabitants of this monastery continued under the absolute authority of their abbot, exclusive of any other; not subjected to vows, but governed by the laws of Columba. During this period, they were what are called Culdees; and all accounts agree in their being renowned for their learning, for their high contemplative piety, and austerity of life. But the establishment of the papal power was accompanied with a great alteration. And monachism having soon after made its way into Scotland, they became an abbey of benedictines, which was of baleful consequence, both to their learning and virtue.

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* Bede, Lib. III. cap. iv.

Amidst the fierce conflicts of surrounding nations, of the Picts, Norvegians, Britons, Irish, and Scots, the veneration with which Columba's institution was regarded by all parties, upheld it in safety: It grew and flourished amidst all the rough vicissitudes of those barbarous times*. Even Magnus Nudipes, the Norvegian conqueror of the Hebrides, notwithstanding all the cruelties of his incursions in the year 1098, moved by the reputed sanctity of the place, spared the island of Iona and its inhabitants from the devastations that in all other parts attended his progress†. But,

Quod non fecerunt barbari, fecere Barberini.

The learning of ages, which had been treasured up in this little island, the records of nations, and the valuable archives of remote antiquity, which had been safe under the fury of barbarians, fell at once a sacrifice a sacrifice to an ill-judged decree of the synod of Argyll. Authorised by this, the zealous mob at the time of the Reformation, fell upon Iona as the most valuable and venerated seat of the popish clergy; and nothing escaped destruction but such parts of the building, and such solid monuments as were proof against the hands of rage, and even the teeth of devouring time.

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* In the year 1210, says Torfæus, a squadron of pirates from Norway, consisting of twelve ships, committed many depredations in the Hæbudæ, and plundered the holy island of St. Columba, which, till that time, had never been subjected to any injury from the Norwegians. Orcades, p. 153.

† Torfæus, Orcades, p. 71.

Mr John Frazer, who was dean of the isles before the Revolution, had a book written by his father, a learned man, who possessed the same office, containing the antiquities of Iona, and above 300 inscriptions. This book which he lent to the earl of Argyll, it is thought was lost amidst the tumults and afflictions of that great man's life. Most of the inscriptions, and those too the most ancient and interesting, are now either half covered with earth and rubbish, or so overgrown with weeds and moss, that it would require both time and labour to bring them to light: But I will here subjoin such an account of the present state of the buildings, and of the most obvious monuments, as a short and hasty stay upon the island would permit.

It is doubtful if any of the present buildings are of so old a date as the age of Columba. For we are informed by our historians, that the abbey having fallen to decay, was rebuilt, and consecrated to Christ and Columba, by Malduinus king of Scotland, about the year 664*. It is not unlikely, that some of the present buildings may belong to this æra, from the smallness of their size, and the simplicity of their structure. And though it is evident, that others of them have been the work of subsequent times; yet the whole appears to be of a more rude workmanship; of a more simple sort of Gothic architecture; and, it is probable, of a more remote date than that of any other of our church buildings now extant in Scotland.

Sodor.—The principal building is the church of St. Mary, which was the cathedral of the bishop of the isles, and is supposed to have been the Fanum Sodorense. There has been great diversity of opinion concerning the ancient Sodor, from which the bishops of the Isle of Man still derive their title. Some have thought that it was the name of a town in the Isle of Man, so late as the fifteenth century. But it is not likely, that a town which then gave title to a bishop, should now be unknown, or that it should have lost its name, no body knows how, since that period. The small Island of Peel, adjacent to the Isle of Man, in which the cathedral of that bishoprick is situated, seems to have had the name of Sodor in the sixteenth century. From this, however, the bishoprick cannot be supposed to have acquired its name: it seems more probable, that the Island was so named in latter times, from the ancient title of the bishoprick. Others have supposed the town upon the Island of Icolumbkil to be the ancient Sodor. But all these opinions are equally erroneous; and it is to search in vain, to search for any particular place which gave the title of bishop of Sodor to the bishop of the Ebudæ.

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* Lesslie, De Moribus et Gestis Scotorum, p. 161.

The Norvegians divided the Hebrides into two districts, the Nordureys and Sudereys: the former containing the island to the north, and the latter, those which lie to the south of the Promontory of Ardnamurchan in Argyllshire. The whole of these islands belonged to the diocese of the bishop of Ebudæ; but his cathedral and residence being in the Isle of Man, one of the Sudereys, which were called in Latin the Insulæ Sodorenses, he was from thence stiled Episcopus Sodorensis. This origin of the title of Sodor, which is clear from the Historical Collection of Torffæus, the Danish historian, as is ingeniously observed by Dr Macpherson*, is plain and intelligible: it was derived from no particular place, but from the principal district of the islands in general. The title of Sodor, however, seems to have been in use chiefly among the islanders themselves; for among the Norvegians, from whose language the name was derived, the bishop of the Western Islands is always stiled the bishop of the Hebudæ.

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* Critical Dissertations, p. 280.

Cathedral.—When the Isle of Man was reduced under the English government, the bishoprick of Sodor was preserved; but its limits being circumscribed to that single island, its bishops bore the united title of Sodor and Man. All the other Western Islands remaining under the Scottish government, were then erected into a separate diocese, called the bishoprick of the Isles. The bishop usually resided in Icolumbkil; and the great church belonging to the abbey, served as the cathedral of the diocese.

St. Mary's church, though inferior to many other Gothic cathedrals and abbeys, of a more recent date in Scotland, has been very magnificent for the remote period in which it was built, and considering the difficulty of building in this secluded part of the world.

Materials.—It is extremely remarkable for the materials of which it is constructed. It is built of the red antique Egyptian granite; the very same stone which the Romans brought from the East, and, with which they erected their most superb monuments. There are rocks of it in Icolumbkil; but that of which the cathedral is built, has been mostly brought from the adjacent coast of the Isle of Mull. There, the stone can be more easily procured, and is of a finer quality; equal indeed to the finest that the Romans ever brought from upper Egypt. It is nowhere polished in any part of the building, but painfully formed by hammering to a plain surface; and there are many fine blocks of it, five or six feet long, both in the walls and in the rubbish. The labour of quarrying and forming such a quantity of this stone as so great a building required, is a piece of work like the Egyptian obelisks, whose execution must strike with surprize the people of modern times. The rock is solid, the stone of almost impenetrable hardness: but time itself cannot impair it; and, where it can be overcome, it is the fittest material in the world for monuments that are to last for ages.

The windows, doors, corners, arches, pillars, and other ornaments of the church, many of which have been exquisitely carved, are all of a fine grey freestone, brought from quarries at a great distance in the Isle of Mull.

The cement of the building, like that of other ancient structures, is so strong, that it is easier to break the stones than to force them asunder. It is of lime that has been calcined from sea shells, and formed into a very gross mortar with coarse gravel, in a large proportion, and a great quantity of the fragments of white coral[*], which abounds upon the shores of the island. The superior strength of the cement in ancient buildings, over that of our modern structures, is ascribed by Linnæus[†], and all other writers, to its greater age. But, till our lime be used with a much greater proportion of water than at present, with a much larger quantity of sand, and that sand of a much larger size, no age nor time will ever render it a cement of equal power to that of the ancients.

When this structure was erected, the fine blue slate in the neighbouring islands of Lorn, was no doubt unknown. But it has been roofed with a stone of a very peculiar and beautiful kind. It is of a rich talky substance, resplendent with the most vivid colours; and used in form of large slates. It has been brought, no doubt, from some of the adjacent islands, though I nowhere met with any natural rock of it.

Dimensions.—The church is built in the form of a cross, and in most places the walls are standing pretty entire to where they join the roof. The south front measures about a hundred and sixty-four feet in length, including the walls, and is all along ornamented with pillars and arches of freestone. The body of the church measures sixty feet in length, and the two cross isles, are each thirty feet in length and eighteen in breadth within the walls.

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[*] Corallium album pumilum nostras, Raj. syn. p. 32. n. 1.

[†] Linnæi Amoen. acad. Vol. II. p. 11.

Cupulo.—The cupulo is a square of twenty-two feet, which is the measure of each of the four arches that support it. Above this, rises a square steeple of the same size, which is decayed at the top, but still remains between seventy and eighty feet high. The ascent in it has been by a narrow winding stair of hewn stone, and towards the top, on the south side, there is a large circular window, lozenged with freestones, in the form of oblique spherical triangles; a Gothic contrivance to admit the light, and exclude the winds and rain, before glass came to be used in churches. It is said, that there was here a fine peal of bells, which were carried to Glasgow at the time of the Reformation.

Choir.—The choir is sixty feet in length within the walls, and thirty-four in breadth over the walls. It has two small chapels adjoining to it, the one on the south, the other on the north side, ornamented with pillars. On the south front of the choir, there are three pillars, whose capitals are of fine workmanship, which support three Gothic arches: here the wall of the choir rises to the capitals of the pillars. The arches seem always to have been void, in order to

light

light the choir on the south side. Above these arches, the wall is built and continued to the top.

The east front of the choir stands entire to the top, about fifty feet high, with a cross of freestone upon it, of the height of three feet. The great window over the altar is placed in the middle, having three slender pillars, which, supporting with those on the sides, four arches, above which, there is one large arch filled with lozenged work of freestone.

Altar.—Within the choir, there are several fine pillars carved in the Gothic way, with great variety of figures representing different parts of the scripture history: And here are still some fragments of the ancient altar table, which was of white marble. Mr Sacheverell who visited this place in the year 1688, relates, that it was one of the finest pieces of white marble he ever saw; about six feet long and four broad, curiously veined and polished, and then quite entire, except one corner which had been broken by accident*. It has since, however, been gradually demolished and carried off; the vulgar in the Highlands being all desirous of having a bit of it as a relic of Columba, and from the superstitious persuasion that the possession of it preserves from shipwreck. There is a bed of this marble, but to appearance an inconsiderable one, on the island; from which, it is said, this altar was procured.

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* Sacheverell's Account of the Isle of Man, p. 132.

Confessional.—Upon the left hand of the altar the fount still remains, and next to that the confessional; a seat about nine feet long, having a fluted pillar at each end, and three arches built into the wall over it of fine workmanship. Two stone partitions come down in the middle, in each of which, there is a small hole for whispering the confessions.

Monuments.—Near the altar, and upon the north wall of the choir, there is a very fine monument of one of the abbots of Iona. His statue, larger than the life, lies at full length, with the mitre, crosier, ring, and episcopal habit. It is all of one entire stone, finely polished, with four lions at the corners, and supported above the ground by a number of short pillars. Round the edge, is accurately engraved this inscription, in the old Gaelic characters:

> **Hic jacet Johannes Mac Fingone Abbas**
> **de Y, qui obiit anno doi. millesimo**
> **quingentesimo.**
> **Cujus Animæ propitietur Altissimus.**

This abbot was a son of the chief of the Mackinnons in the Isle of Sky, whose name has, of late only, been altered from that of Macfingone. This monument is usually thought to be of black marble; but it is of the true basaltes of Pliny, a stone incomparably harder than any species of marble. It is what the columns of the Giants causeway in Ireland consist of, and of which there are similar columns in several parts of the Isle of Mull, from whence this block has probably been brought. It resembles our common whin-rock, but is harder, blacker, and of a finer grain. The hardness of it is such, as makes the execution of this monument really surprising, which has been the workmanship of no inconsiderable statuary. The cushions on which the head of the statue rests, look as if they would feel soft; and the foldings of the drapery, notwithstanding the obdurate nature of the stone, are light, easy, and natural. Being thus remarkably qualified to resist the injuries of time, we accordingly find it as entire, and every the slightest touch of the chizzel as sharp as on the day it was finished.

It is quite otherwise, however, with another fine monument that stands opposite to this, on the south side of the choir, and which seems to be of an older date: it is that of Abbot Mackenzie, who was a son of the family of Seaforth. His statue has been dressed with the same episcopal ornaments as the former; but being unhappily of freestone, the whole is now almost obliterated, and no vestige of an inscription can be seen.

Before the altar, in the middle of the choir, lies another fine monumental stone of the basaltes. It has the figure of a man in armour upon it, as large as the life, in relievo; and is said to be that of one of the Macleans of Douart, who were for many ages lords of Mull. We were told, that it had been richly embossed and ornamented with silver, but there is nothing now remaining but the tradition of the precious metal.

In the small chapel adjoining to the south wall of the choir lies interred Lauchlan Macfingone, father of the above abbot, under a plain stone, with this inscription, in Gaelic characters.

> † Hæc est Crux Lacclani Macfingone et ejus
> Filii Johannis Abbatis de Y, facta
> Anno Domini MCCCCLXXXIX.

Monastery.—Along the north side of the cathedral, and immediately adjoining to it, is the monastery; consisting of a number of buildings of different sizes, and built at different times. Here were the cells and apartments of the religious, but now so perfectly ruinous, that they convey no distinct appearance. Upon the west side there are the remains of a very fine cloyster; and, adjoining to it, a large building, consisting of two floors, each of which has contained only one large hall. That upon the ground is vaulted above, and paved with hewn stone; this was the common hall for the public exercises and disputations. The upper one, which has likewise been paved with hewn stone, above the vault, was the library, which, it is said, was a most extensive and valuable collection of ancient records and ancient learning.

Library.—All that I could learn of its fate was, that the reformers came so suddenly upon Icolumbkill, that the inhabitants had time to carry little or nothing away. Some of the books and papers, however, were conveyed to the castle of Cairnburg, belonging to the chief of the Macleans, and then judged impregnable. Here they remained till a siege, in the time of Cromwell, when they were mostly destroyed by fire. Some of them, however, still escaped, of which I got notice of one manuscript, and saw an old gentleman in whose hands it had been for some time; but found, after hunting it through three or four islands, that the last leaves of it, as it was unhappily vellum, had fallen a sacrifice for measures to a taylor. It was a Latin translation of an Arabian work on physic.

Columba's Tomb.—Within the church, towards the north-west corner, there is a ruinous cell, which, tradition bears, was the closet whither Columba retired at stated hours to perform his devotions. And, upon the outside of the church, towards the west, there is a little stone inclosure with a monument sunk in the ruins, where, it is said, Columba was entombed. This, indeed, is contrary to the account given by Cambden, of his being buried at Down, in Ireland, with St. Patrick and St. Bridgid, and to the old Irish distich,

> **Hi tres in Duno Tumulo tumulantur in uno,**
> **Bridgida, Patricius, atque Columba pius.**

But, Adamnanus * informs us that Columba died in Icolumbkil, thirty-four years after his first coming to Britain from Ireland, that is, in the year 598, in the seventy-sixth year of his age, and it is not likely that he would be carried any where else to be buried.

Bishop's House.—Upon the north side of the monastery stand the remains of the house which was the habitation of the bishop of the isles; a simple low building without any ornament, which appears to have consisted of one large hall and two or three small chambers. On the other quarters around the monastery, are the ruins of several detached buildings, some of which appear to have been granaries and offices, and others, small chapels whose history is now lost.

Oran's Chapel.—At some distance from the cathedral, to the south-west, stands St. Oran's chapel, dedicated to Oran a famous disciple of Columba; it is sixty feet long and twenty-two broad within the walls, and choaked up with monumental stones, either covered with moss or half buried with rubbish. This was the burial place of the Macdonalds, kings of the isles and lords of Ila; of the Mackenzies, Macleods, and other great families. There is here one monument, still obvious and entire, having a ship upon it with hoisted sails, a standard, and four lions, with the following simple inscription, in Gaelic characters:

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* **Adamnan. vit. Columb. Lib. III. cap. xxvi.**

> Hic jacet Corpus Angusii Filii
> Domini Angusii Macdomuil
> de Yle.

This is probably the monument of that Angus who was lord of the isles in the reign of Robert the Bruce, and the steady friend of that monarch in his greatest misfortunes.

King's Tomb.—The cemetery to the south-west of the cathedral, is the place where the ancient kings of Scotland were buried. Some of our historians reckon their number forty-eight, and account Icolumbkil the usual place of the interment of our kings, from the death of Fergus the second, or, from about the year 430. But it is not probable, nor are there any accounts sufficiently authentic, to prove that this island was the sepulchre of any of the Scots kings previous to Columba's settlement, which was not till the year 564. It is therefore most likely, that Eugenius the third, who died in the year 568, was the first king who was buried in Iona. And from that period, what our historians relate may be admitted; that there was a series of thirty kings interred in this place, until the reign of Malcolm Canmore, when the abbey of Dunfermline became the royal sepulchre.

We have no accounts in history of any remarkable monument that ever was erected in this place to the memory of any of these kings, and there is none at present, indeed, to be found. Buchanan relates, that, in his time, there were three small shrines in this cemetery; of which, that in the middle, bore this inscription, Tumulus Regum Scotiæ; that on the right hand, Tumulus Regum Hiberniæ; and the one on the left, Tumulus Regum Norvegiæ. Upon the spot which he points out, there still remains a small building which answers exactly to the description he gives; and, what renders it more certain, there is a ruinous heap, overgrown with grass, at a little distance from it on each side, which appears to be the remains of the other two buildings he mentions.

This shrine, like all other monuments over the graves in this place, faces the east; it is not above ten feet long, and five feet broad within; its walls are only about four feet high, and the roof is arched and built entirely up with stone. These dimensions show that it could scarce serve for burying more than one person at a time; and yet, in this small space, the above thirty kings seem to have been all entombed during the currency of four hundred and thirty-two years.

Around this small building, a considerable space of ground is covered with the monumental stones of the chiefs and principal families in the Highlands. Each stone lies flat upon the ground, and is seldom larger than the dimensions of the grave it covers. It was the ancient custom, as it still is in some places, to bury the whole family, or at least the heads of it, under the same stone; which appears to have been the case with this sepulchre of the kings. It differs from all the other monuments in this cemetery in being built; the rest being all such single stones as have been now described, and is thereby sufficiently distinguished to be the shrine which Buchanan describes. It is now, probably, above seven hundred years old, and has been very rudely but strongly built. It is yet quite entire, except at one corner where part of the roof has fallen in, or perhaps has been broke down by the curiosity of people to view the inside; but there is now no vestige of an inscription upon any part of it.

The remains of thirty kings, and some of them very great ones, reduced to such a span: The dust of Achaius, of the Donalds, of the Constantines; of Kenneth the second, and Gregory the Great, each of them the conqueror of a potent kingdom, all confined within the walls of this narrow house, is such a curiosity as is nowhere else, perhaps, to be met with in the world; and, to a contemplative mind, the saddest spectacle of human greatness.

Inscriptions.—All the monumental stones in this burying ground are entire blocks, either of the basaltes or of whinrock. Some of them are far sunk in the earth, and appear extremely ancient, and each of them has the figure of a man in armour upon it, at full length, in relievo; but there are few inscriptions upon them sufficiently obvious, to be easily decyphered.

Near the tomb of the kings there is an inscription upon a stone, written, it would appear, before the use of surnames, and in a Gaelic character more ancient than that of the preceding inscriptions. The inscription itself is remarkably simple:

Or doman Fataric.
On the tomb of Patrick.

Not far from this, there is another inscription written in a similar character, upon a stone half sunk into the earth.

Coromac Ulfhada hic.

This Coromac is said, by the people of the country, to have been one of the kings of Ireland in very ancient times. And both this and the former stone are situate in the place where Buchanan describes the tomb of the Irish kings to have been.

Upon the west side of the church, there is the following inscription in Gaelic characters, but without a date:

Hic jacet Johannes Betonius
Maclenorum Familiæ Medicus.

And below it this distich.

Ecce cadit Jaculo victrici Mortis iniquæ,
Qui toties alios solvit ipse Malis.

The physician of the family of Maclean was always of the name of Beton. But it is thought that the person here buried was the doctor Beton, a man famous in his profession, who was on board the Florida, one of the largest ships of the Spanish Armada, when she was blown up in the Sound of Mull, in the year 1588. He escaped unhurt, and lived for several years after.

Crosses.—In the field, upon the west side of the church, there is a cross, which appears to be of a very ancient date. It is of one stone near eight feet high and twenty inches broad, set in a pedestal. It is of the hardest whinrock, and though it has the appearance of great age, it is but little impaired except at the top, where a part of it has been broken off by violence. Adamnanus[*] seems to mean this stone, where he informs us, that in Columba's time, there was a cross which stood midway between the monastery and granary, which was afterwards, says he, fixed in a pedestal. This is the precise situation of the cross we describe, for there is a very ancient ruin of the granary about the same distance west from it, that the church is distant from it to the east. This cross is of a different form, and apparently of a different æra, from any others to be seen in the Highlands: and no wonder; as it appears to be contemporary with Columba, and the oldest monument extant in the Island of Iona; nay, probably, the most ancient christian monument in Scotland.

At some distance from this cross, to the south, there stands another, of a much larger size and more entire. It is one solid column of the hardest whinrock, fourteen feet high, and yet only eighteen inches broad and six inches thick. It is fixed in a pedestal of one stone, which is about three feet high, and hewn quite round into three steps. Though posterior to the former, it appears to be very ancient. The labour and art of quarrying such a column, of transporting it to the island, and of polishing and erecting it when it was brought, are circumstances really surprising in those early times, when one considers how inadequate the power and skill of that part of the country would be at present to the execution of such a work.

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[*] Adamnan, vit. Columb. Lib. III. cap. xxix.

All the buildings and monuments hitherto described, with the gardens around the monastery, have been surrounded with a strong wall, which is now mostly demolished; and the whole grounds within it are overgrown in the summer time with such rampant weeds, that it is difficult to wade through them.

Causeway.—From this place, to another ancient building, which was a nunnery, there runs a causeway, about three hundred paces in length, and about fifteen feet broad, intersected at right angles by another of the same kind, which runs from the shore to the village. This causeway consists entirely of large blocks of the same red granite of which the cathedral is built, and which are very artfully wrought and compacted together.

By the side of it, on the left hand as you go from the shore to the church, there stands another cross and the only one that now remains, besides the two above mentioned; though, it is said, there were above

bove an hundred of them upon the island before the reformation. It is a grey whinstone, ten feet high, fourteen inches broad, and only three inches thick. It is perfectly entire, but has no inscription upon it; finely shaped and accurately carved, with a variety of pretty Gothic ornaments; and is indeed, a very elegant column. Adamnanus* relates, that upon the death of Ernanus, a famous presbyter, which happened upon his arrival in the island, between the haven and the monastery, a cross was set up by Columba on the spot in which he died. It is not probable that the above cross is of so old a date, though it answers exactly to the situation here mentioned; but from this relation, we find upon what occasions these crosses used to be erected.

Nunnery.—The nunnery is a plain square building. The walls of it are pretty entire, and it has had a court within, paved with hewn stone. The building of it is erroneously referred to the days of Columba; for as nunneries were not known in Scotland till the introduction of the regular popish clergy, it must be of a much posterior date. The chapel has been a very neat building, and is said to have been the burial place for the ladies of high rank, as St. Mary's church and Oran's chapel were for the men. Upon one monumental stone here, there is the following inscription.

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* Adamnan, vit. Columb. Lib. I. cap. xxvii.

Behag Nijn Sorle vic Horid Priorissa.
Bathia Daughter to Somerled, Son of Gilbert, Prioress.

Upon another fine stone of the basaltes, there is a bas relief of the Virgin Mary, and under it, one of a prioress in an episcopal habit, with a mitre on her head. Round the head, is Sancta Maria ora pro me; and both figures are surrounded with this inscription:

Hic jacet Domina Anna, Donaldi Ferleti Filia,
Quondam Priorissa de Iona.
Quæ obiit Anno Domini
Millesimo Quingentesimo et Undecimo.
Cujus Animam Abrahamo commendamus.

Conclusion.—These are all the observations that occurred in viewing the ancient buildings of this famous island. Many curious discoveries in the Irish and Scots antiquities might probably be made by recovering the inscriptions which are overgrown with moss or overwhelmed with ruins; but this is what could not be attempted in a stay of two days upon the island. The oldest inscriptions may be expected upon the monuments in the open air; for, of those which are within the buildings, there are none which appear much older than two centuries before the Reformation. In the cemetery which surrounds the tomb of the kings, are many monumental stones that have sunk deep by time into the earth. These, it is likely, are the most ancient, and have been erected before the custom of placing them in churches was introduced.

It now remains to take a view of the rare productions which this island affords in the Fossile, Vegetable, and Animal kingdoms.

FOSSILS.

I.

NEPHRITICUS *divi Columbæ* tenebrosus viridis semipellucidus homogeneus, fractura plana scabriuscula, superficie olearia.

St. Columba's Nephritique, or, Port-i-curach stone.

NATURAL CHARACTER.

Situation.—It is formed in detached masses in the veins of the rocks of serpentine, or Ophites *Columbæ* which is found upon this island; from these it is dislodged by the waves and dispersed along the shore.

Substance.—It is a fluor, or crystallized stone, of a homogeneous substance, resembling quartz.

Though to appearance equally hard with quartz, it does not strike fire with steel.

It admits of a fine polish, but inferior to that of a cornelian.

It is semi-pellucid, and of a green colour; but sometimes it is clouded with white and yellow spots, which are opake.

Its natural surface, both to the eye and touch, is smooth, soft, and, to appearance, oleaginous; and this property is still more remarkable when the stone is polished.

The powder of the stone is white.

Figure.—It is found in nodules from the size of a pea to that of an apple; but the larger it is in size, it is generally less bright in colour, and more frequently filled with foulness and opake clouds than when it is small.

It has no determinate figure: it is irregularly round, oval, oblong, or compressed, by being water-worn; the surface being always convex, but never angulated.

Structure.—At first sight its structure may appear to be indeterminate, but when attentively viewed, especially after it is burnt in the fire, it may evidently be observed to be of a laminated structure.

The fracture is plain, vitreous, but a little rough, and its grain scaly.

Its surface is always smooth, and never covered with any crust.

Experiments.

1. Two pieces of the Nephriticus *Columbæ*, each weighing four and a half grains, were put into oil of vitriol and the fuming spirit of nitre. They remained in the acids eight hours without effervescence or solution, when they were taken out unaltered.

2. A piece of Nephriticus weighing four and a half grains, of a fair green colour, was put into aqua fortis; a pretty brisk ebullition instantly ensued which cracked the glass, but it was soon over and did not discolour the menstruum. When no more air bubbles arose, the stone was taken out and put into fresh aqua fortis, in which it lay eight hours without any alteration. When it was taken out and dried, it was found to have lost half a grain of its weight. This piece, now consisting of four grains, lost nothing of its weight in aqua regia.

3. A piece of Nephriticus weighing six grains, and of a fine green colour, was put into the muriatic acid; a gentle effervescence went on for an hour, which gradually ceased, and communicated a green colour to the menstruum. The stone being taken out, it was observed to be a little corroded; it had lost its green colour and one grain of its weight.

When the stone is powdered and put into the muriatic acid, it effervesces violently, and throws out a sulphureous smell.

4. A piece of the stone, of an uniform green colour, weighing one hundred and two grains, was put into the muriatic acid. After the effervescence was over, the menstruum was green; and the stone had lost its green colour, and was become white, wherever it was in contact with the acid: it had lost six grains, or, one thirty-fourth part of its weight.—A decoction of galls added to the green solution, produced a milky coagulum, which subsided and left the menstruum of its natural colour.—The volatile alcali added to this solution, after a violent effervescence, formed a milky coagulum tinged with blue.

5. A piece of the stone reduced to an impalpable powder, was put into the volatile alcali, where it remained two days without any visible alteration. The alcali was then poured off, and the powder being spread out upon paper, it became covered, in several places, with spots of a bright blue colour.

6. The Nephriticus remains in the fire without motion or noise. When once made red hot, it loses entirely its green colour and transparency, and becomes whitish and opake; it loses its glassy appearance and becomes dull, and its hardness is diminished; it loses also, its smooth or oleaginous property,

and becomes dry and rough.—A piece weighing three hundred and fifty-seven grains, after being kept an hour in the open fire, lost fifty grains; but after three hours further burning in a more violent fire, it lost only four grains more.

7. This mass, now weighing three hundred and three grains, was committed to a vitrifying heat in a crucible, with another inverted above it, where it was kept half an hour. After it was cold, no alteration could be perceived in it, but the mass was cracked in several places; its colour, substance, figure, and structure, were the same as before.—It now weighed only two hundred and sixty-two grains, having lost forty-one in this intense heat, besides the fifty-four lost in the two former ustulations.—It remained quite entire and without heat when put into water; and had acquired no luminous property in the dark.—It was now perfectly undissolvable in all the mineral acids.

8. A mass of Nephriticus being burnt to whiteness, was reduced to an impalpable powder, an ounce of which was committed in a crucible to a strong vitrifying heat. The fire was kept up till the crucible began to run, upon which it was removed. When cold, this fine powder was found not to be in the least vitrified, nor so much as hardened, nor any way altered.

9. A quantity of the same impalpable powder of burnt Nephriticus, being mixed with half its weight of salt of tartar, was committed in an open crucible, to a vitrifying furnace. The mixture, in eight minutes, was brought to a fusion, and being then removed and cooled, it was found turned into an opake glass of a reddish colour full of small round pores, but so hard as to strike fire with steel.

CHYMICAL CHARACTER.

1. The Nephriticus *Columbæ* is not dissolvable in water, nor does it imbibe it in any degree, either before or after ustulation.

2. It is altogether insoluble in the vitriolic acid.

3. A ninth part of its weight is dissolvable by aqua fortis, with effervescence; the residuum is insoluble in aqua regia.

4. A sixth part of its weight is dissolvable by the muriatic acid, with effervescence, with which it forms a green coloured solution.

5. It communicates a blue colour to the volatile alcali.

6. It loses a seventh of its weight in an open fire, and a fourth of its weight in a vitrifying furnace.

7. By ustulation it loses its transparency, its green colour, and its oleaginous property, and becomes opake and white, with a dry surface; but acquires no phosphorous quality.

8. It is neither calcinable nor vitrifiable per se.

9. After ustulation, whether detatched from the fuel or in contact with it, it is wholly undissolvable in the mineral acids.

10. With half its weight of fixed alcali, it vitrifies into a reddish, opake, porous glass, which strikes fire with steel.

Observations.

1. It appears from the above experiments, that the Nephriticus *Columbæ* contains a singular earth, dissolvable in the nitrous and muriatic acids, but unaffected by the vitriolic. That it receives its green colour from copper dissolved by an acid; and that it probably contains a bituminous matter, the cause of its oleaginous property. But besides these, its chief ingredient is an insoluble apyrous crystallized stone, similar to quartz; but differing from it by its laminated structure and not striking fire with steel. This, no doubt, is itself a compound, but one which cannot be decomposed by the above trials with fire and acids.

2. Those parts of the stone which are soluble in acids, are volatile in the fire: the copper with which it is tinged goes mostly off, though it would appear not entirely; for as the stone gives no symptom of iron, the reddish colour of its glass is probably owing to some remains of the copper.

3. The lapis nephriticus is omitted by Linnæus in his system, though usually enumerated by other authors among the gems. It has always been greatly esteemed by the Asiatic nations, especially for ornamenting their fine arms. It was anciently in such high repute likewise in Europe, that the emperor Rodolphus the second is said to have purchased a nephritique stone at the price of one thousand six hundred crowns; nor was it valued only as an ornament, but so extolled for its virtues as an amulet against the stone, the epilepsy, and other diseases, as to be termed the lapis divinus. We have since, however, either lost the stone, or it has lost these virtues in modern times.

4. The lapis nephriticus has been considered as an agate, a jasper, a gypsum, and a smectis, by different authors. Their variety of opinion has not been confined to different genera, but they have referred it to the widely different classes of crystalline, gypseous, and apyrous stones. Hence, it has been described by some as not being laminous; and by others, as having a laminated structure: by some,

as capable of a lively polish; by others, as susceptible of no polish: by some, as entirely soluble in acids; by others, as insoluble: by some, as having so feeble a texture as to be destroyed by being infused in a decoction of herbs; and by others, as of such a compact structure that it cannot be cut or polished but by powder of diamonds.

It is impossible that such jarring opinions could have arisen from the consideration of the same body; and, therefore evident, that very different fossils have been considered, by different authors, as the lapis nephriticus. Rather than hunt after the uncertain synonyma of discordant writers, or to pursue similitudes in their imperfect accounts, it was judged more useful to give such a description of the stone we consider to be a species of nephriticus, as may serve, easily and unquestionably, to distinguish it from any other.

5. A little creek in Icolumbkil, called Port-i-curach, is the only place in Britain where these stones have hitherto been discovered, which are known all over the Highlands, by the name of Port-i-curach stones. They are carefully picked up by the inhabitants, to sell or give away to strangers; and if free from blemishes, transparent, and of a good green colour, are extremely beautiful when polished; and fit for seals, buttons, and the tops of snuff boxes. It is rare, however, to meet with them of a sufficient size for these purposes, and, at the

same time, perfectly unblemished. The people imagine that they improve in their transparency, and become of a more lively colour by remaining long in the sea; but I had no opportunity of being satisfied of the truth of the observation.

II.

Nephriticus *scintillans*, compositus: substramine albo opaco quartzoso scintillante; granulis nephriticis viridibus semipellucidis angulatis.

This stone is originally formed in the same rocks with the Nephriticus *Columbæ*, from whence it is dislodged by the force of the waves, and scattered along the shore. It is found in much greater masses, being sometimes larger than a man's head, and always rounded by the motion of the waters. It is a compound stone, the ground of which is a peculiar species of white quartz, the Quartzum *unctuosum*, which is charged with grains of pure Nephriticus *Columbæ*, from the size of a pin's head to that of a pea. They are generally green, but sometimes yellowish; and by their being more or less numerous, diversify the appearance of the stone, and make it appear prettily spotted when it is cut and polished.

III.

Marmor *Ionæ* album scintillans, granulis inæqualibus lamellosis amorphis: lamellis splendentibus, particellis micaceis argenteis.

Marmor solubile, particulis micantibus arenaceis. Linn. Syst. Nat. p. 155. n. 5?

Calcareus scintillans albus. Waller. Miner. sp. 42. var. 1?

Icolumbkil Marble.

Description.

This Marble is of a fair white colour, and semi-pellucid in a thin plate. It is composed of small irregular masses, cemented together without any order, but of a laminous structure; the laminæ being plain, parallel, and resplendent. These masses are intermixed with a great many small shining particles of the mica argentea. The stone is sometimes filled with blackish parallel veins of different breadth: these are quite opake, and composed chiefly of a blackish mica. It breaks with a shining plain surface, and the grain of the fracture is gross, rough, unequal, and laminous.

Experiments.

1. The stone is easily reduced to powder by a file, and yet strikes fire readily with steel.

2. It dissolves with effervescence in all the acids.

3. Burnt in an open fire, it loses its splendour, transparency, and hardness, and becomes of a dead white colour, opake and friable; but the particles of the black and white mica suffer no alteration.

4. It calcines to a quicklime extremely pure and white, and with a much less degree of heat than any kind of limestone.

Observation.

There are some small strata of this marble in the island, from whence the large altar table of the cathedral was taken, which is mentioned above. The remains of it have stood exposed to all the inclemencies of the weather, without being any way effected by it, except in change of colour, from white to a light yellow, which commonly happens to other white marbles. It is a stone, therefore, very proper for monuments that are to stand in the open air: it cuts freely and receives a good polish, when the laminous masses, and micaceous particles of which it consists, shine distinctly through the surface.

IV.

QUARTZUM *unctuosum*, nodosum album opacum, superficie convexa unctuosa, fractura hebeti: particellis micantibus.

Quartzum solidum, attactu pingue. Waller. Miner. sp. 101?

This stone consists of solitary dispersed masses, from the size of a walnut, to that of a human head. They are irregularly round, oval, or compressed; their surface being always convex by being waterworn. They are originally included in the veins of the rocks of the Ophites *Columbæ*, from whence they are detatched by the waves, and scattered in great plenty along the south shore of Icolumbkil.

The stone is of an equal, solid, indeterminate structure; strikes fire with steel, and admits of a polish nearly equal to that of marble. Its fracture is not so white as its external surface, but of a watery or bluish white colour; a difference which seems to be owing to the contusion of the surface upon the shores. The surface of the stone also is smooth, and, as it were, unctuous to the touch; but this is not so remarkable where the stone is fresh broken.

The fracture of the stone is not so brilliant as in the species described by Wallerius. It is the species of quartz which is the ground of the Nephriticus scintillans.

V.

SCHISTUS *maculatus*, coeruleo-niger hebes, maculis superficialibus ovatis sparsis coeruleo-nigris crystallisato-nitidis.

The hills and shores, on the north-east side of Icolumbkil, are mostly composed of this stone, which is disposed in strata, inclined to the horizon at an angle between seventy and eighty degrees. It does not strike fire with steel, yet is firm, hard, and not at all friable. The fragments of the stratum are thick, affect something of a rhomboidal shape, and are divisible into parallel plates. The transverse fracture of the stone is very unequal, and, to appearance, striated from the numerous minute seams in the stone; and the particles are equal and almost impalpable. The longitudinal fracture is streight, but rough and unequal, as the plates do not part easily from each other. The surface of the plates is covered with oval spots of a blackish blue colour, resembling the grain of steel, composed of small shining particles, which look like crystallised iron. A line drawn upon these plates, either with iron or with a bit of the stone itself, is of a whitish colour. The seams of the plates are often filled with a brown or yellow ochre of iron. It is a true schistus, but the smallness and irregularity of its plates render them unserviceable for the purpose of slates.

VI.

SYENITES *Ionæ*, granite rubro lamelloso opaco, fragmentis quartzosis albis opacis subvenosis interspersis.

NATURAL CHARACTER.

Situation.—It forms extensive rocks, composed of irregular vertical beds, which are full of veins.

Substance.—It is a solid compound stone, of a degree of hardness between marble and jasper; strikes fire abundantly with steel, and admits of the finest marble polish. It is perfectly opake, and variously spotted and veined with red and white colours.

Structure.—The red parts of the stone are of a laminated structure, but those which are white have no regular structure: the fracture is rough and shining.

Composition.—The stone is composed of pure red granite, and the Quartzum opacum of Linnæus.

The granite is the ground and chief ingredient of the stone. It is of a deep red, opake, and of an impalpable grain. It strikes fire with steel, and its fracture is plain, laminated, and a little shining.

The quartz is white, opake, of an indeterminate structure, and its fracture shining and angulated. When the stone is broken, the quartz appears in masses of an irregular figure and of various sizes, and frequently in veins which run nearly parallel.

These two ingredients of the stone are concreted together in the firmest manner, without any gluten or intermediate matter that is perceptible.

CHYMICAL CHARACTER.

1. Neither the granite nor the quartz, in this Syenites, are in the least affected by any of the concentrated mineral acids.

2. The stone burns in an open fire without noise or motion, and, though cracked in many places, gives fire with steel after the ustulation.

3. The granite is not sensibly altered by the burning; but the quartz loses any degree of splendour it formerly had, and becomes of a dead white.

4. The stone burnt in an open fire, reduced to a fine red powder, and committed to a vitrifying heat, ran, in ten minutes, to a pure white half transparent glass, which broke with a shining surface.

5. Some part of the powder, in the heart of the mass, which was not vitrified, still retained a faint degree of its red colour; but whatever was perfectly vitrified, was pure white.

Observations.

1. There are extensive rocks of this stone upon the south-west shore of Icolumbkil, in the neighbourhood of the Ophites *Columbæ*. They are very sound and entire, and may be raised in blocks of any dimensions. The stone is of the same genus, but a different species from the Syenites *antiquorum*, or red antique granite, which is described in my account of the Isle of Mull. It is nearly of the same degree of hardness; assumes as fine a polish; and, though opake, will be thought by many to be a more beautiful stone.

2. The Granite in this compound stone is harder, and of a brighter red colour, by its concretion with a very hard quartz, than is usual in the simple red granite; and, in general, all the metallic colours of stones, especially those derived from iron, seem to be more bright and vivid the harder the stones are in which they subsist.

3. The iron with which the granite in the Syenites is tinctured of a red colour, is evidently volatile by a vitrifying heat; if it were not, it would communicate some colour to the glass, which is not the case; and the same thing holds in the simple red granite, which is found without any admixture.

4. Quartz and granite, in equal parts, are easily vitrifiable without any other addition; as they were nearly in equal proportion in the mass of the Syenites vitrified in the above experiment. This was to be expected, not only because two apyrous earths are often found fusible when combined, but because the granite is easily vitrifiable by itself. The iron it contains being entirely volatile in the furnace, cannot be supposed to give fusibility to the mixture.

5. The Syenites *Ionæ* appears capable of being vitrified, without any addititions, into a white crystal glass of a very good quality.

VII.

Ophites *Columbæ*, scintillans opacus hebes viridis, fractura scabriuscula, pectine subimpalpabili, politura marmorea nitida.

St. Columba's Serpentine.

NATURAL CHARACTER.

Situation.—It constitues extensive rocks composed of vertical strata, or of such as are inclined from sixty to eighty degrees to the horizon. Their fragments are oblique and angulated: their veins are filled with Nephritieus *Columbæ*, Nephriticus *scintillans*, and Quartzum *unctuosum*.

Substance.—It is a solid homogeneous terrene stone, no way crystallized; strikes fire easily with steel, and admits of the finest marble polish, and a shining surface.

It is perfectly opake, and generally green, but varies greatly in the shades of that colour. Frequently it is veined or spotted with a deeper green, and frequently with black. Veins of black mica are also sometimes to be observed in it.

Its surface, when polished, is perfectly smooth, but no way oleaginous.

Structure.—It is of a solid, equal, indeterminate structure: its fracture is plain, a little rough, and perfectly dull: its grain and particles almost impalpable.

Experiments.

1. A piece of the Ophites being put into the vitriolic acid, there is not the smallest alteration produced; not the least solution, nor so much as a bubble excited.

2. A piece of the Ophites, of a fair green colour, being put into aqua fortis, a few bubbles were at first emitted, but after the stone had continued in the menstruum six hours, its weight was the same. The acid received no tincture from the stone.

3. Nine grains of the Ophites being put into the muriatic acid, a little effervescence ensued, and the menstruum received a slight greenish tincture, yet did not dissolve so much of the stone as to render its weight sensibly diminished.

4. When the stone is pulverised, put into the volatile alcali, and afterwards exposed to the air, it assumes a faint blue colour.

5. A mass of the Ophites weighing six ounces averdupois, was kept four hours in a strong open fire, in which it made neither noise nor motion. When taken out, it had entirely lost its green colour, and was become of a reddish brown and bloated in some places of a grey colour, so as to appear of a heterogeneous kind of substance. It had many cracks, at which places it broke easily, but where it was entire, it was still so hard as to strike fire with steel. It had lost in the fire two grains, or one forty-eighth part of its original weight. A fragment of this, weighing three ounces averdupois, being kept some hours in water, and then taken out and made dry on the outside, was increased one grain, or one forty-eighth part of its weight: but the stone, before ustulation, receives no additional weight by being kept in water. After it is burnt, the mineral acids have no effect upon it.

6. A mass of the Ophites, after being thoroughly burnt in an open fire, was reduced to a fine powder, of which two ounces were exposed in a crucible to a vitrifying heat: it ran to a black opake glass, solid at bottom, but porous towards the top, which broke with a dull surface. An ounce of calcined Ophites, in one solid piece, exposed to the fire at the same time, was more than half vitrified into the same kind of glass.

CHYMICAL CHARACTER.

1. The Ophites *Columbæ* is entirely insoluble in the vitriolic and nitrous acids.

2. It makes a little effervescence with the muriatic acid, and gives it a slight greenish tincture, but is so little dissolved, that its weight is scarce sensibly diminished.

3. It gives a blue colour with the volatile alcali.

4. It burns in the fire without motion or noise.

5. By ustulation, it loses its green colour, and turns to a reddish brown. It is filled with cracks, but is still so hard as to strike fire with steel.

6. By ustulation it loses one forty-eighth part of its weight, and afterwards acquires the same proportion of additional weight when put into water, but imbibes no water before it is burnt.

7. It is not calcinable.

8. It vitrifies *per se,* into a black dull opake glass.

Observations.

1. The stone evidently receives its green colour from copper, and I found imbedded in the rocks a great many dispersed particles of the copper pyrites. It seems also to contain a considerable proportion of iron, which turns it to a reddish colour in the fire, and communicates the black colour to its glass; and, it is not unlikely, that without this admixture of iron, the stone itself would be apyrous.

2. The quarries from whence the ancients extracted their Serpentine are now unknown, though it is highly probable they brought it from upper Egypt along with their granites and porphyries. In its external appearance it very much resembles our Ophites *Columbæ*, and seems very different, in most respects, except in colour, from the modern Serpentine of Saxony, which is a talky stone that hardens indeed in the air, but is so soft when first taken out of the earth, as to be wrought upon the turning loom, into a variety of toys and utensils. There are still some fine remains of the Greek and Roman artists preserved in Serpentine; but the seeming hardness of the stone, and the minuteness of the workmanship, has made some imagine that it was soft, like the modern Serpentine, when first extracted from the earth. This is not probable, however, as the antique Serpentine seems not to be a talky stone, but of the same nature and hardness of the Ophites *Columbæ*, which, though indeed very hard, is softer

than the antique Jaspers, in which there are many works of the ancient statuaries, still more elaborate than any that are preserved in Serpentine.

3. The Ophites is to be considered as a genus of simple rock, possessing the principal characters delivered in the description of the above species. This Icolumbkil Serpentine, like the antique Serpentine, may appear to some as a talky rock, or Lapis ollaris, and, indeed when polished, both of them have some such appearance. But the Icolumbkil Serpentine is vitrescible *per se*, and, from its aspect, the antique Serpentine seems to be of the same nature; and neither of them have any regular structure, nor any thing unctuous in their substance. By these characters, they are essentially distinguished from the modern German Serpentine, which is a true Lapis ollaris, and from all the other stones of the talky kind. None of the three stones, however, can with any propriety be termed a marble, as they contain nothing calcarious, but belong either to the vitrescible or apyrous tribe.

4. The Ophites *Columbæ* abounds upon the southwest shores of Icolumbkil; the harbour especially, called Port-i-curach, where Columba landed, is surrounded with extensive rocks of it. It may be there raised in blocks of any dimensions, but not without excessive labour, on account of the solidity of the rock. When polished, it is a stone of singular beau-

ty, and of equal merit with the antique Serpentine, which it very much resembles, but its hardness is such, that it could not be cut to any large size without a very high expence.

VIII.

Ophites *syeniticus*, viridi rubro albo varius, ex Ophite *Columbæ* et Syenite *Ionæ* compositus.

Among the rocks of the Ophites *Columbæ* and Syenites *Ionæ*, which occupy the south-west shores of Icolumbkil, there are others of this stone, which is variously composed of these two species. In some rocks of it, the green serpentine is prevalent, filled with red and white clouds and veins of the Syenites; in others, the red Granite of the Syenites serves as the ground, and is diversified with white and green veins of the Quartz and Serpentine. As the stone admits of a fine polish, it may be easily imagined to be extremely beautiful, when thus variegated with these striking colours.

IX.

Hieracites *undulatus*, friabilis, coloribus mutabilibus splendens, lamellosus, lamellis undulatis, squamulis pellucidis, particulis arenaceis quartzosis.

Mica fluctuans squamosa. Waller. Miner. Vol. I. p. 245?

NATURAL CHARACTER.

Situation.—This is a compound micaceous rock, whose strata are composed of parallel slaty fragments.

Figure.—These fragments are easily divisible into others, and the surface of each is not plain, but alternately raised and hollowed, so as to appear waved.

Substance.— The stone is friable, opake, and unctuous to the touch. The white, black, and yellowish mica of which it chiefly consists, give it a very shining appearance, and reflect a variety of changeable colours.

Structure.—Its structure is wholly laminous. The longitudinal fracture is streight, and the surface undulated and resplendent: the transverse fracture is rough, unequal, dull, and full of seams, which appear in an undulated direction.

Composition.—The stone is chiefly composed of grains of white, yellow, and black mica, which are opake, scaly, variously imbricated, and approaching to a concave and convex figure. The smaller scales of the white mica, which is the principal ingredient in the stone, are plain, brittle, pellucid, and float upon water.

This micaceous ground of the stone is charged, in several places, with particles of white Quartz.

Observations.

1. The name Hieracites, which is derived from ἹΕΡΑΞ, Accipiter, has been applied by Mineralogists, to stones of a scaly imbricated structure, resembling the plumes of a hawk. It is here considered as a generical name for the compound micaceous rocks, whose structure is of this kind, and of which we have many remarkable species in Scotland.

2. The white Mica which constitutes the greatest part of the Hieracites *undulatus*, is the Mica particulis squamosis sparsis. Linn. Syst. Nat. p. 159, n. 3. which is the Mica squamosa alba. Waller. Miner. Vol. I. p. 244.

3. The Hieracites *undulatus* is not in the least affected by any of the concentrated mineral acids. By burning in the fire, the white, yellow, and black Mica it contains, become more resplendent, and all of a gold colour; and the small scales which were formerly pellucid, are now opake. When reduced to a fine powder, and exposed to a vitrifying heat, it runs to a coarse black glass, extremely porous and perfectly opake.

4. It is the stone with which the monastery in Icolumbkil has been anciently covered, in the form of large thick slates, great numbers of which are still to be seen in the ruins; but the place from which they had been brought is now unknown. Though it is a stone that may be crumbled between the fingers, it seems capable of resisting the injuries of the air for a great length of time. It may be easily broke, indeed, by external force, but it is proof against the dissolving power of water, and the corrosion of the air.

PLANTS.

I.

PULMONARIA *maritima*, calycibus abbreviatis, foliis ovatis, caule ramoso procumbente. Linn. Sp. p. 195. n. 5.

Echio affinis planta marina nostras, folio incano, ad cordis effigiem formato. Sibbald. auctar. mus. Balfour. p. 81. Scot. Illustr. T. 12. f. 4.

Sea Bugloss.

This fine plant was first discovered in Scotland, above an hundred years ago, by the learned Sir Andrew Balfour, and afterwards by Mr. Ray, on the sea shore near Berwick. It was found in flower in Icolumbkil on the second of July, and is frequent upon the stony beach of most of the Western Islands, where it highly ornaments the shores with its beautiful flowers, and the elegant glaucous colour of its foliage. It is reckoned by Dillenius the most beautiful plant that is native in England.

It is remarked by Linnæus as being sometimes annual, and sometimes perennial; but upon the shores of the Hebrides it appears to be constantly biennial. Upon the coast of Iceland, however, where it likewise grows, it will probably be an annual plant, and perennial in a warmer climate than that of Britain. The first year, it forms a plant composed only of radical leaves spread out upon the ground, and these, as well as the radical leaves of the flowering plants, are always heart shaped with long footstalks; whereas the leaves on the stem are always oval and sessile. Hence it would appear, that the Pulmonaria *Sibirica Linn.* is the same plant, and no distinct species.

There is great reason also for thinking the Pulmonari *Virginica* of Linnæus only a variety of this plant. Its leaves are seldom more lanced than those of the *maritima*, and are generally as exactly oval and more obtuse; and the stems of both are procumbent, though that of the Virginica is not usually so much branched. The chief distinction between the two plants consists in the flower; and that, not in the number, figure, or situation, but in the proportion of the parts. The flowers of the Virginica are larger, the empalement much smaller in proportion to the flower, and the tube of the petal is longer than the limb; whereas, in the *maritima* it is rather shorter. All these distinctions, however, put together, amount to no more than what we might expect to find in the same plant, native in Virginia, and the most northern parts of Europe, and leave little room to doubt that the two plants are the same species.

As the Pulmonaria *angustifolia Linn.* possesses no specifical distinction from the *officinalis*, and is undoubtedly a variety of that plant, it is remarkable, that the five species of Pulmonaria in Linnæus's System, ought, with propriety, to be reduced to two: an instance rarely to be met with in the writings of that great author, the merit of whose judgement in the distinction of species is so much to be admired.

II.

SALIX *fusca*, foliis integerrimis ovatis: subtus villosis nitidis. Linn. Sp. p. 1447 n. 26.

Salix humilis repens. Lob. Adv. p. 423. Fig.

Salix pumila brevi angustoque folio incana. Bauh. Pin. p. 474.

Salix humilis. Ger. Em. p. 1391 Fig 6. Raj. Syn. p. 448. n. 6.

Salix procumbens, foliis lanceolatis, subtus sericeis. Haller. Act. Helvet. Vol. V. p. 39. n. 94.
Brown Willow.

Like all the other Willows, this species varies considerably in the size and figure of its leaf, according to its soil and situation. On hard gravel, or upon rocks, its leaves are small, oval, and perfectly obtuse; but in blowing sand on the sea shore, where it frequently grows, they are much larger, and though generally oval, are sometimes lanced, and always acute. In the latter situation, its procumbent stems are sometimes a yard long, but in the former, seldom above a foot. Its leaves are always of a dusky green on the upper side, and commonly smooth: on the under side, they are always covered with a fine white down, which gives them a shining silvery appearance.

Eeach leaf has two small oval acuminated *Stipulæ* which soon fall off, and are to be found only adhering to the new expanded leaves.

It is enumerated by Linnæus among the Willows with an entire leaf, but as Haller observes, its edges have generally a few denticulations, especially towards the point of the leaf, but they are small and apt to be concealed by the rolling back of the leaf.

Our plant is preserved, in Buddle's Hortus siccus, as the above species in Ray's Synopsis, where there is a name of Bauhinus's Pinax applied to it, which belongs to the Salix *repens Linn.* This species of the Synopsis is quoted by Linnæus as belonging to the *repens*; but though Bauhinus's name may belong to it, the Salix *humilis* of Gerard is the name of the Salix *fusca Linn.*, which appears to have been the plant intended by Dillenius under this species of the Synopsis.

III.

GENTIANA *campestris* corollis quadrifidis fauce barbatis. Linn. Sp. p. 334. n. 23.

Vernal Gentian.

It is suspected by Linnæus either as a hybrid plant, or as a variety of his Gentiana *amarella*. There is little foundation for imagining it to be of hybrid origin, but a great deal of reason for thinking it to be only a variety of the *amarella*. The two plants are undistinguishable from each other in their stature and foliage, and in the form and colour of their parts. The flower of the *campestris* appears earlier in the season, and is divided into five, but that of the *amarella*

rella into four segments. These are the only distinctions to be observed between them.

This small distinction in the flower, could not alone constitute a specifical difference between the plants, though it were invariable. But it is observed by the Rev. Professor Martyn, in his Plantæ Cantabrigienses, that the flower of the *amarella* is often found divided into five, as well as into four, segments; and, on this account, he very properly considers the plant only as a variety of the *campestris*.

The two plants vary indeed so much in their time of flowering, that the *campestris* is commonly called the vernal, and the *amarella* the autumnal Gentian. The flower of the *campestris* may, perhaps, appear more early in the season in other places, but in Icolumbkil, its first flowers were not expanded till the 4th of July, and at a higher station in the Isle of Rum, not till the 20th of that month. In other parts of Scotland, the *amarella* is in flower generally about the middle of August, so that the difference in the time of their flowering is not very considerable. The two plants, therefore, must undoubtedly be considered as varieties of the same species.

IV.

PHASGANON *Columbæ*, stipite plano, inferne fimbriato, radice biloba, lobis magnis subrotundis cavis aculeatis.

Fucus bulbosus, Huds. F. Polyschides, Lightf.
St. Columba's Tangle.

This is the largest of all the submarine plants that have hitherto been discovered on the British shores. Some of the plants measured from twelve to fifteen feet in length, with very large roots, stems, and leaves in proportion. It is cast up by the sea in great plenty in the small creek of Port-i-curach, upon the south end of Icolumbkil, nor have I ever fallen in with it any where else. It is, no doubt, to be found in other places, but it is certainly a rare production, as there is no name nor figure of it to be observed in any of the botanical systems: nor is it only rare, but very extraordinary and peculiar in its structure.

It has two great lobes situated at the bottom of the stem and filled with air, which are a very singular production, and different from every thing of the kind, in those submarine plants, that have hitherto been described. Some species of the Fuci are re-

remarkable for Bullæ, or vesicles filled with air: but they are generally small, dispersed in great numbers over the stems or leaves, and chiefly towards the extremities, remote from the root. One chief purpose, if not the only one they answer, is to serve as fulcra, or, as air bladders for supporting the plant buoyant in the water; for as these plants, in which they are found, are of a firm coriaceous substance, and of a greater specific gravity than water, without this additional lightness communicated to them by these air bladders, they could not remain erect, nor even float in that element: they would fall flat to the bottom, which, we find, is not the natural position of any submarine plants, and may, therefore, be judged improper for their vegetation.

The two great lobes in this plant, though of a different form, and differently situated, seem to answer the same purpose with these air bladders. The plant itself is nearly upon an equilibrium with the water, but the stem is very long and pliant, so that it requires some aid to preserve a proper position, even in its own element. This assistance the two great bladders placed at the bottom of it do evidently afford. Being filled only with air, and far lighter than water themselves, they must always float erect, and as the stem is fastened to them on each side, they preserve it from sinking in the water, and communicate to it some degree of their own vertical direction.

The strong firm aculei, or prickles, with which these bladders are surrounded, are no less singular, and evidently serve for their protection against the rubbing of rocks, the attacks of stones, and other external violences that occur amidst the tumults of the waves. The air bladders upon the other Fuci have no such provision, because they are numerous; and what are lost, are continually supplied by the growth of others: but this plant has only two for its supporters, during the whole period of its growth, and their loss seems irreparable. The breaking of but one of them would no doubt disturb, perhaps, put an end to the progress of its vegetation.

V.

Bombycina *Pinea*, caule subdichotomo, ramis longissimis subsimplicibus: filo centrali filamentis subramosis erectis, obsito.

Fucus incurvus, Huds.

Pinus maritima sive Fucus teres, cujus ramuli setis sursum tendentibus sunt obsiti. Raj. Syn. p. 50. n. 46.—Buddl. Hort. Sicc. Vol. I. fol. 18. fig. 3.

Pine Silkweed.

DESCRIPTION.

It is a plant of a singular aspect and structure. Its stems and branches, which are only about the thickness of a gross thread, are thickly set round from top to bottom with short filaments, half an inch long, which give it some resemblance to the branches of a pine tree. This appearance also is apt to deceive, and make one imagine that these filaments may be a smaller plant growing accidentally upon a larger one; but they are always of the same substance and structure with the stems. Though its stems are divided generally in a dichotomous order, yet, in some places, it produces small irregular branches. It is devoid of every sort of articulation; of a firm tough substance; is semipellucid, and of a brown colour when recent, but becomes black by drying.

OBSERVATIONS.

1. This plant, which has been but little known to botanical writers, was first discovered on the English shores by Mr Doody, and published in the Appendix to the second edition of Ray's Synopsis. That his name in the Synopsis quoted above, belongs to the plant here figured, is evident from the specimen of it preserved in Buddle's Hortus Siccus.

2. The

2. It is a rare plant in the Deucaledonian sea, and did not occur any where else, except in one place upon the Island of Pabbay.

VI.

Bombycina *foeniculacea*, caule continuato, ramis teretibus alternis, inferne nudis, superne ramosissimis, radice digitata.

Conferva foeniculacea, Huds.

Conferva marina foeniculacea. Dill. Musc. p. 16. T. II. f. 8.

Fennel Silkweed.

DESCRIPTION.

It is of a cartilagineous semipellucid substance, and varies greatly in its size and colour. It is to be found from three inches to three feet in length, is commonly of a brown colour, but is sometimes yellowish, greenish, or of a reddish brown. Its stem is from the size of a thread to that of a crow quill, round, smooth, and inarticulated, and is commonly continued to the extremity without being lost in the divarications of the branches. Its ramifications are filamentous, and somewhat resemble those of the foliage of Fennel; the extremities of the branches are usually bifid, having two unequal segments, but are sometimes pectinated, having two or three small short filaments placed on one side. It turns darker coloured, and sometimes black by drying, and its stems and branches shrink and grow more slender; but upon being put into water, they swell and reassume their original size and colour.

It is a very frequent plant over all the Deucaledonian sea. Two younger specimens of it were found upon Icolumbkil, but without the fructification.

VII.

LICHEN *omphalodes*, imbricatus, foliolis multifidis glabris obtusis incanis, punctis vagis eminentibus. Linn. Sp. p. 1609. n. 20.

Crostil. Martin's Descrip. of the Western Islands. p. 135.

This plant is known over all the Western Islands by the name of Crostil or Crotal, and is used by the inhabitants for dying their plaids and other woollen stuffs, of a red and philamot colour. All the rocks in Icolumbkil are so thickly crusted over with this plant, that a ship load of it might be collected from them in a little time. The natives extract the dye from it by macerating the plant in urine, and the colour it affords by this means, is of a very singular nature, as will appear by the following experiments.

EXPERIMENTS

On the dye afforded by the Lichen *omphalodes Linn.*

1. The plant does not communicate its dye to common water, or, at least, does not tinge it of a deeper colour than an infusion of green tea.

2. Limewater drew from it the same slight tincture as common water.

3. When the volatile alcali is poured upon the plant, it immediately communicates to the liquor, a tawny red colour.

4. Digested in water, with a proportion of the volatile alcali, for twenty-four hours, in a sand heat, it gave a tincture, quite opake in any considerable body, but in a thin column transparent, and of a deep tawny crimson.

5. The vegetable, muriatic, nitrous, and vitriolic acids, highly concentrated, did not hurt the colour of this tincture, but formed, in the mixture, a coagulum of the same red colour.—The fixed alcali, the

volatile caustic alcali, and alcohol, had no other effect than to dilute it.—To the mixture of the tincture with the caustic volatile alcali, was added the vitriolic acid: great heat, noise, and white fumes arose, but the red colour remained unprejudiced.—Nor did any of these dissolvents either heighten or turn it to a different shade.

6. This tincture stood six months exposed to the air in an open glass, without having its red colour in the least impaired.

7. The plant gives much the same crimson tincture with the fixed, as with the volatile alcali; but not so deep a dye with urine as with either of these.

8. The fixed alcali and quicklime drew from it a deep tincture, but not of so fine a colour as the tincture made with the fixed alcali alone.

9. Digested in the vegetable acid, the acid remained clear and colourless.

10. Urine and quicklime drew no tincture from the plant.

11. The infusion of the plant in water was not discoloured by the addition of the salt of steel.

OBSERVATIONS.

1. We are informed by Linnæus that the Lichen *omphalodes* is used as a dye by the people in Sweden, and that they dye their cloths of a yellowish colour with it by boiling, without the assistance of any saline lixivium. It appears, however, from the above trials, that the plant will not communicate its dye to simple water by infusion. In this it differs from the other vegetable red dyes of Brazil, Logwood, and Madder; and also from the animal red dyes of Cochineal, Gum-lac, and the Coccus *polonicus*, which do all communicate their red colour to water. In refusing to do this, and in striking a red colour with an alcali, it corresponds with the Orcella.

2. Dillenius relates, that the dye obtained from this Lichen is not durable, and is easily washed out; whereas, we find in the above experiments, that its infusion in the volatile alcali affords one of the most indestructible of all colours. The colour remains, after the substance that extracted it is gone: it is not in the least impaired by long exposure to the air; nor can it be either destroyed or changed by acids, alcalies, or alcohol. A most singular property! as there is no red dye in use that remains unaltered by these powerful liquors.

3. All the red dyes which are brightened by acids, are entirely destroyed by them, when applied in a greater quantity. The extreme fixity of the colour produced from this Lichen, appears therefore to be the reason, why it receives not any brighter shade by the addition of acids. And whatever method might be fallen upon to heighten and improve its colour would probably be the means also of rendering it a more perishable dye.

4. The permanency of the colour produced from this Lichen with the volatile alcali appears the more singular, since the dyes finished, as the artists speak, in an alcaline lixivium, are generally fugitive. The volatile alcali, for example, extracts, but at the same time, volatilizes the red colour of Madder.—The vegetable substances which afford the most durable dyes, are observed to be of an astringent nature, and to this astringency, the durability of their colours has been ascribed. But this cannot be the case with the Lichen here mentioned, for its infusion is not discoloured by the salt of steel, nor does it discover to the taste, any degree of astringency.

5. It was observed above, that the dye of this Lichen resembles that of the Orcella, as both refuse to give out their colour to water, but impart it freely to the volatile alcali. The two colours differ widely, however, in their degree of fixity, and in

another remarkable circumstance. The dye of the Orcella is extracted by urine and quicklime, but quicklime prevents the extraction of the colour from the Lichen *omphalodes*, and debases it when extracted.

VIII.

SPONGIA *Columbæ*, sessilis rarissima pellucida sepimentosa, sepimentis planis inosculatis: supra foraminibus rotundis.

St. Columba's Sponge.

DESCRIPTION.

It is of a round compressed shape, and about four inches in diameter. Its substance is very tough, yet soft, delicate, and elastic. It eagerly imbibes water and parts with it freely; and though never so often wetted and squeezed, suffers no alteration in its substance or figure. These properties would render it valuable could it be found in any considerable quantity, and, for many purposes, it would be much preferable to the common sponge of the shops.

It consists of a number of partitions about a quarter of an inch thick, standing close together, and joined to each other in several places by inosculations. These partitions upon the under side, next the root, are imperforate, but upon the upper side, they are perforated by small round holes dispersed over their surface.

Of this fine sponge, which is different from all those in Linnæus's System or Ray's Synopsis, there was but one specimen found upon the south shore of of Icolumbkil.

Besides the above plants more particularly described, there grow likewise upon Icolumbkil,

IX. Erynœgium *maritimum Linn.* Sea Holly.

Frequent in blowing sand upon the beach.

X. Cotyledon *umbilicus Linn.* Wall Pennywort.

It over-runs the walls of the monastery, and grows likewise upon the sea rocks. Nor does it appear to abound so remarkably any where in Britain as in the Western Islands and about the city of Bristol. It expands its first flowers in Icolumbkil, about the 22d of June.

XI. Geranium *cicutarium Linn.* Hemlock-leaved Cranesbill.

The sandy pastures in Icolumbkil are all red with the flowers of this plant in the beginning of July. It was not observed to be different from this species of Linnæus, only, most of the names of the *cicutarium* describe it as perfectly inodorous; whereas, this Icolumbkil plant has a most powerful and heavy scent, altogether different from that of musk, or of the Geranium *moschatum Linn.*

XII. Inula *Helenium Linn.* Elecampane.

This plant grows adjacent to the walls of the monastery, where it has no doubt been planted by the monks, sometime before the reformation. It seems not to have ever propagated itself by seeds, nor has it overspread any considerable space of ground, but is confined to two or three small tufts, where it has probably subsisted for above two hundred years.

ANIMALS.

ANIMALS.

I.

Colymbus *grylle*, pedibus palmatis tridactylis, corpore atro, tectricibus alarum albis. Linn Faun. suec. n. 148.

Greenland Dove.

DESCRIPTION.

Head.—The bill is without teeth, streight, subulated, black, and of an equal length with the head.

The upper mandible projects a little over the under one with a crooked point.

The inferior mandible is a little gibbous towards the middle.

Body.—The bird is about the size of a pigeon, and the whole body is of a deep black, without the admixture of any other colour.

Wings.—The wings are shorter than the body, and very small for the size of the bird.

The primary flag feathers are eight in number, of which, the most exterior one is the longest. They are black on both sides, but of a paler colour at the points.

The secondary flag feathers are also black, and about eighteen in number.

The inferior covert feathers are white.

The superior covert feathers are also white, and form a large oval white spot on the upper side of the wing.

Train.—The train is short, black, and composed of twelve feathers.

Feet.—The feet are of a bright red colour, and palmated with three toes, having no back toe.

The nails are black and crooked.

OBSERVATIONS.

1. I shot this bird in the sound of Icolumbkil on the 3d of July, and often observed it at sea, among the Western Islands. It never approaches the shore,

except at the time of hatching. The shortness of its wings renders it incapable of rising to any considerable height, so that it always flies parallel with the sea, and near its surface.

2. It was described by Linnæus, in the tenth edition of his Systema Naturæ, with a white abdomen, but this error is corrected in the last edition of the Fauna suecica. Its breast and abdomen are totally black, by which it is strongly distinguished from a similar species, the Alca *lomvia*, *Linn.* which has a white breast.

3. It was formerly considered by Linnæus as an Alca, but in the last edition of the Fauna suecica, it is more properly referred to the Colymbus. The Alca *lomvia*, and Alca *Alle Linn.*, should either be referred likewise to the Colymbus, or with the Colymbus *grylle*, be constituted into a separate genus between the Colymbus and Alca.

II.

PAPILIO *Io*, tetrapus, alis angulato-dentatis fulvis nigro-maculatis: singulis supra ocello coeruleo. Linn. Faun. suec. n. 1048.

The Peacocks Eye.

DESCRIPTION.

It is well distinguished from all the numerous species of this genus by one very large eye towards the anterior extremity of each wing, resembling the great eye upon the feather of a Peacock.

The eye upon the anterior wings has a pupil of a brownish red colour, and an iris of black, white, and blue, behind which are placed two round white points. The anterior part of the wing is of a reddish brown, and the posterior margin blackish, with an angle towards the extremity. The anterior margin has two large black bars, and towards the head is minutely variegated with black and white.

The eye upon the posterior wings has a pupil of bright blue edged with black, and surrounded with a white iris. The anterior part of the disc is blackish, the interior of a reddish brown: the posterior margin blackish, with an angle about the middle.

The wings on the under side are uniformly variegated with blackish colours, and there are six small whitish obscure points placed in a line towards the exterior margin of the anterior wings. It has only four feet, and four brown plumated palpi.

It is the most beautiful *papilio* hitherto observed in Scotland, and was found the 3d July among the grass in Icolumbkil.

III.

Phalæna *Hebridiana*, noctua spirilinguis cristata cinereo-nebulosa, alis superioribus maculis ovalibus albis inferioribus puncto nigro.

Hebridian Moth.

DESCRIPTION.

Head.—The feelers are setaceous and placed between the eyes at a distance from each other. The eyes are large and black: the tongue spiral.

Body.—The body is gross, whitish, and downy. The thorax is covered with a large crest of down. The thighs are downy, and the feet whitish, with black rings.

Wings.—The wings are deflected, and mostly of a grey colour. The posterior margin of each wing is denticulated with eight small downy denticulations; and near the margin, there is a black line composed of little arches answering to the denticulations.

The superior wings are wedge shaped, and variegated on the upper side with grey, white, and black colours. The anterior part of the disc is covered with three or four large spots, irregularly oval, of a white colour, with a black margin. The posterior part of the disc is variegated, and towards the margin, there is a series of arrow shaped spots of a black and white colour. The under side of the wings is clouded with grey and white.

The inferior wings are whitish, and without any stain on the upper side. On the under side, each has a round black point on the centre, with an obscure curve line running from it like a tail. Towards the margin, there are two broad transverse bars of an obscure blackish colour.

OBSERVATIONS.

1. This insect was found at night in Icolumbkil, in our tent, on the 3d of July, and afterwards, in the Isle of Man. It is of the size of a wild bee, and approaches nearest to the Phalæna *polyodon* of Linnæus; but is a species perfectly well marked, and quite distinct from all that he enumerates.

2. We are acquainted with no genus of Natural Bodies, of Fossils, Plants, or Animals, so amazingly numerous as that of the Phalæna, which now contains towards five hundred species clearly described by Linnæus. Here that acute distinguisher of bodies declares himself at a loss, and that he has been obliged to omit many species, from his being incapable to distinguish them properly by words. As the diversity of nature, therefore, does here threaten to overpower the language of art, it should be the care of Naturalists to alleviate, and not to increase the burden, by any addition of species which are not strongly characterized, and clearly distinguishable from those which are already fully determined.

IV.

Libellula *cancellata,* alis basi luteis, macula albida marginali, abdomine luteo nigro-punctato.

Libellula alis basi immaculatis, abdomine dorso lateribusque interrupte luteis. Linn. Syst. Nat. p. 902. n. 7.

DESCRIPTION.

Head.—The eyes are brown above, and greenish below, with a black oval pupil. Behind the eyes, there is a yellow line with two black spots.

Body.—The thorax is brown; and has on each side two broad yellow parallel lines. And besides these, each side is stained with six small yellowish spots.

The abdomen is slender and round, black below, and yellowish above. It consists of eight rings, and each ring has two black points upon it, except the first, third, and eighth.

Wings.—The wings are of a water colour, but yellow at the base, with a rhomboidal spot near the tip of the exterior margin. At the base of each wing there is a small whitish spot upon the margin, of a curved shape.

The legs are black.

OBSERVATIONS.

1. This insect was found in Icolumbkil on the 2d of July, in a piece of marshy ground in the centre of the island. It exactly resembles the Libellula *flaveolata Linn.*, and is, perhaps, only a variety of it, or a different sex.

2. It is observed by Linnæus to have no stain upon the base of the wings, but in many individuals,

the wings were constantly observed to be of a yellowish colour at the base. There is also a whitish marginal spot at the base of each wing, not mentioned by Linnæus, nor observed in any other Libellula, in which the essential character of this species seems to consist. These circumstances rendered it doubtful if our insect was the Libellula *cancellata*, till I was assured of it by Mr Fabricius, an accurate Zoologist, often mentioned in the last edition of the Systema Naturæ, who had seen the insect in Linnæus's collection at Upsal.

V.

TENTHREDO *livida*, antennis septemnodiis nigris, annulo albo, corpore fusco-nigro.

Tenthredo antennis septemnodiis, corpore atro, abdomine supra infraque livida. Linn. Syst. Nat. p. 925. n. 33.

DESCRIPTION.

The feelers are black, with a white ring towards the point, but the point itself is also black. The eyes are black, with a white point. The body and legs are black and brown, and the abdomen on the upper side mostly brown. The wings are of a water colour, with a small white scale placed behind them.

OBSERVATIONS.

1. This insect, which was found on Icolumbkil on the 4th of July, is near the size of a small domestic bee, and very much resembles those Ichneumons which have black antennæ, with a white ring.

2. Linnæus observes that the white ring in the antennæ belongs only to one sex; but of half a dozen specimens which were collected, and of different sexes, not one was found without it.

3. He describes the body also as being sometimes totally black, which he ascribes also to a different sex; but this was not found to be the case in these specimens. The male is much smaller than the female, having more black than brown upon the body, and, the female more brown than black.

VI.

Tellina *Columbæ*, testa orbiculari convexa subæquilatera alba, striis transversis elevatis concentricis recurvatis scabris.

St. Columba's Mey.

DE-

DESCRIPTION.

Shell.—It is a white transparent shell, considerably convex, and nearly of an orbicular shape, being usually from one inch to an inch and a half in diameter. It is covered with elevated transverse ridges which are nearly concentrical, and make the shell feel rough by being sharp and a little reflected towards the summit. It is of a dull white on the inside, and on each of the valves; when recent, there are two broad lines near the margin, which are pale, transparent, and concentrical.

Valves.—The valves are equally convex and perfectly similar, with an entire margin: they are connected by a ligament on one side, and are covered in the recent state with a thin brown cuticle.

Sides.—The shell is nearly equilateral, but that side on which the ligament is placed, is a little longer and streighter than the other.

Bosses.—The bosses stand close to each other; they are short, crooked, and a little sharp, and bended from that side on which the ligament is placed.

Hinge.—The hinge in each valve has two teeth in the centre, one of which is perfectly entire, the other is larger and a little notched. It has no teeth on the margin.

OBSERVATION.

This is a shell not hitherto recorded as a native of Britain, and different from all the species of Tellina enumerated by Linnaeus. It was found in abundance on the sandy shore of the harbour in Icolumbkil.

VII.

Arca *pilosa*, testa orbiculata equilatera longitudinaliter striata, suturis transversis, margine crenato, umbonibus incurvis.

Arca testa suborbiculata equilatera *pilosa*, natibus incurvis, margine crenato. Linn. Syst. Nat. p. 1143. n. 182.

DESCRIPTION.

Shell.—It is a gross firm shell nearly of the size of a pullet's egg, but pretty exactly orbicular. Its valves are equilateral, equally excavated, and perfectly similar. Their margin on the outside is entire, but crenated on the inside with above forty notches.

Cuticle.—It is covered with a brown villous soft cuticle, which may be perceived to be disposed in minute longitudinal lines. When the cuticle is worn off, the shell becomes of a dull white, stained with brownish or yellowish spots, almost fasciated and disposed longitudinally. The shell then appears covered with longitudinal furrows diverging from the summit to the base, and with curved transverse sutures. The older shells are perfectly white and smooth.

Bosses.—The bosses are but a little protuberant, curved at the extremity, both being bended to one side, and standing close to each other, but without touching. The two valves are connected together by a ligament on each side of the bosses.

Hinge.—The hinge is plain, having in each valve from five to twelve oblique short teeth, on each side of the boss. But the number of teeth is always greater on the one side of the boss than on the other. There is a deep hollow or cavernula at the summit of each valve covered by the hinge.

OBSERVATION.

This is a very rare shell, found in the Mediterranean, and inserted for the first time, in Linnaeus's last edition of his Systema Naturae. It has not hitherto been discovered on the British shores, or in any of the northern seas of Europe. It was found in great plenty, upon the shores of the sound of Icolumbkil, opposite to the Isle of Mull, and also in the Islands of Sky and Man. The Arca glycymeris Linn. found in the Isle of Guernsey, is the only other species of Arca yet discovered on the coasts of Britain.

VIII.

Bulla *scotica*, testa obovata alba pellucida fragilissima, transverse striata, lineis longitudinalibus, vertice subumbilicato.

DESCRIPTION.

Shell.—This delicate fine shell, which is about the size of a pidgeon's egg, is of a pure white colour, transparent, and extremely tender.

It approaches to an oval shape, but it is very obtuse at the base, and attenuated towards the summit. It is covered with transverse furrows, which diverge from the interior lip, and with pale transparent longitudinal lines, which diverge from the summit to the base of the shell.

Aperture.—The aperture is large, smooth and oblique, contracted towards the summit, where it is emarginated, or terminates in an indenture, but widely expanded towards the base.

The exterior lip is smooth, equal, and entire.

The interior lip is smooth and reflected.

Spiral.—It

Spiral.—It has no exserted spiral, but the summit of the shell is terminated by a small round concavity.

Column.—The column is smooth, wreathed, and so open, that the summit of the shell is perceptible through the spiral it forms.

OBSERVATION.

The European seas afford but few shells of this genus, and the species here described, is the first that I have discovered on the British shores. It would seem to be a very large shell, and not hitherto described. It approaches nearest to the Bulla ligniaria of Linnaeus, but appears to be a different species. It but very seldom occurs even in the Deucaledonian sea; for, among all the western islands, I found only two specimens of it, one upon the sandy bay below the monastery of Icolumbkil, and one upon the island of Tirey. Though it subsisted in greater abundance, it could not be expected to be often found entire, being of so delicate a substance, as scarce to bear handling without injury.

IX.

Cancellus *belgicus*.

Pediculus Ceti. Baster. opusc. subseciv. tom. II. lib. iii. p. 140. tab. xii. f. 3.

Phalangium (balaenarum) abdomine dilatato muricato, rostro subulato. Lin. Syst. Nat. p. 1028. n. 6.

DESCRIPTION.

Head.—The head is joined to the thorax, and of a compressed shape, consisting above of four small plates, resembling joints, which are placed crossways.

The head terminates in a beak or rostrum, which is cylindrical, truncated, and much shorter than the abdomen or any of the legs.

The mouth is placed on the underside of the head, and consists of an aperture with four valves.

It has no feelers, nor any eyes that are perceptible.

Body.—The body is of an oval and compressed shape, and of a whitish or light brown colour, as are all the other parts of the animal.

The thorax is composed of three convex rings, of which the posterior one is the broadest, with a short obtuse spine in the middle.

The abdomen is attenuated, pyramidal, smooth, without joints, and truncated at the extremity.

Limbs.—It has eight jointed legs, whose joints are inserted like cups within each other. The posterior legs are the longest. The anterior ones are the shortest, and joined to the head. The other six are joined to the thorax.

The base of each leg consists of four joints; the thigh of one, which has a small obtuse spur at the bottom; and the tibia of two. Each leg is terminated by a small sharp claw.

OBSERVATIONS.

1. This very singular animal was found among the sea weeds on the shore of Icolumbkil, and is found likewise upon the coast of Holland. It is mentioned by Gronovius, by the name of Polygotum, described and figured by Dr. Baster, as a species of the Pediculus Ceti, and introduced by Linnaeus in his last edition of the Sytema Naturae, as a Phalangium.

2. Linnaeus is uncertain, whether it properly belongs to the Phalangium or Acarus, or if it should constitute a peculiar genus. But, according to Dr. Baster's opinion, and by the above description, which was made from the animal while alive, it cannot with propriety be referred to any of the Linnaean genera. It is here considered, therefore, as a peculiar genus, with this character :—a cylindrical rostrum,—a quadrivalvular mouth,—a pyramidal abdomen,—eight feet,—and neither eyes nor antennae.

3. The animal here described, answers exactly the figure and description of Dr. Baster, but the name of Linnaeus above quoted, seems to refer to an animal of a different species, but of the same genus.

IV.

HISTORY

OF THE

ISLAND OF JURA.

Dimensions.—ADJACENT to Isla, lies the long extended ridgy island of Jura, conspicuous over many countries, by the height of its mountains. It stretches twenty four computed miles in length, nearly from south west to north east, and is in most places about six or seven miles broad. But, supposing it to be only thirty measured miles long, and six broad, which is surely a very low computation, it then contains one hundred and fifteen thousand two hundred English statute acres. The proprietors are Campbell of Jura, Macneil of Colonsay, the Duke of Argyll, and Campbell of Shawfield.

Mountains.—The mountainous ridges occupy the middle of the island, and run from end to end, rising still higher and higher, as they run from the north-east, till at last in the south-west they terminate in four peaked mountains of a great height, and of a similar shape. Two of these stand close together, and bound the westerly part of the island. They are much higher than the others, and are well known by the name of the paps of Jura, to the sailors who frequent the Deucaledonian sea.

It is remarkable, that, in their direction, the islands of Isla and Jura stand cross to most of the other Hebrides. The chain which composes the long Island, the Isles of Sky, Mull, and most of the others, stretch out south and north, as do also the ridges of their mountains, in the same direction with the coast of Scotland that is next adjacent. But Ila and Jura, with all their mountains, observe an opposite position, and extend lengthways, only two or three points from east to west. Their position however is still the same, with respect to the neighbouring coast of the main land; as they run nearly parallel with the great promontory of Knapdale and Cantire, which like these islands, stands cross to the general direction of the coast of Scotland. The direction therefore of Isla and Jura, though contrary to that of the other Hebrides, appears to be the effect of the same cause: of that cause, which made Britain itself run parallel to the coast of Scandinavia; and stretched out Madagascar in a line with Africa: of that great law, which seems to have subsisted at the formation of the earth; by which all the islands of the globe in general, are extended in length, in the same direction with the coast of the next adjacent continent.

Rocks.—The rock of which the mountains of Jura are composed, is so full of fissures, that it is brought easily to pieces by the force of water. This is the reason, why they are sometimes covered from top to bottom, with one continued shoal of loose rocks and stones, and for a great extent, entirely destitute of herbage of any kind. And the rock itself, being of a whitish colour, these parts of the mountains appear, at a great distance, as if covered with snow. The fissile nature of the rock is likewise the reason, why the sides of the mountains are so deeply cut in many places with frightful gullies by the torrents: in other places it is worn out into caves, especially upon the sea-shore, where there are several of very large dimensions. Though the rock of these mountains however is thus frequently found full of veins and fissures; yet in many places, it is to be seen piled up in vast solid beds without any cracks, and its substance is, on these occasions, extremely hard and durable, It is of a very singular species, seldom to be met with in other countries, and shall be afterwards particularly described.

Waters.—The island abounds greatly in springs, and in rugged steep descending rivulets falling from rock to rock, from their source to the sea. They are numerous indeed, but none of them are large, as the monuntainous ridge which runs lengthways through the island, determines their course upon its sides, to a run of four or five miles only. Two of them however, the rivers of Crakbreac and Nissa, are of a larger size, and of a gentler course than the rest, and are plentifully stored with salmon. As for lakes, there are none considerable; nor indeed is there any room for them, the whole country being almost one congeries of steep declivities. Water is nowhere permitted to loiter, having scarce sooner sprung from the earth, or fallen from the heavens, than it is rapidly precipitated into the sea.

Harbours.—Though the country is high and its shores bold, it is not remarkable for the goodness of its harbours. Besides the sound of Isla, it has no safe retreat for a vessel of any burden, except the bay of Meill, on the south-east part of the island, where there is very safe anchorage; but the entry to it is a little dangerous, through a cluster of islets called the small Isles of Jura. The coast of the island being generally straight, forms no other considerable bay except Loch Tarbat, on the north west side, which is large indeed and well sheltered, but so filled with rocks, both above and below water, that no vessel can enter it with safety.

Sound of Isla.—The channel, which separates the islands of Isla and Jura, is about ten miles long, and in some places, two broad, but in others it is not above half a mile over. It is called the sound of Isla, and passed among the Norvegians, in former times, by the name of Ilarsund. It is greatly frequented by shipping, especially by the vessels from Ireland, and from most of the ports on the west coast of Britain, which trade to Norway and the Baltic. This narrow channel is the only passage they have, going either south or north through the Hebrides. For, between the north-east extremity of Jura, and the country of Lorn, there is nothing but danger from the currents and the broken land. And from the western extremity of Isla, on the other hand, to Barra head, though an extent of sea of above a hundred miles, yet it is every where so embarrassed with shoals and sunken rocks, that no passage that way can be safely attempted.

The sound of Isla is, in most places, about twenty seven fathoms deep at mid-channel, quite free of rocks, and its coasts so bold, that a vessel of burden may run any where within pistol-shot of the shore. The flood comes into it from the south, from between Cantire and Isla, and runs through at the rate of six miles an hour, retiring from the north, with the same rapidity. At spring tides, the water rises ten feet; and a south-west wind makes the highest flood. The tide ebbs and flows regularly for six hours, and runs so strong and fair, that in two hours, it will carry a vessel clear through the sound, without either sail or direction.

Eddies.—In traversing the shores of the sound of Isla, in a yawl, I met, for the first time, with an appearance in the tides, which I afterwards found very frequent among the Hebrides. When the tide sets with a current through any strait or sound, in every bay, upon its coasts, there is a stream that runs in the opposite direction.

This stream is called by the sailors an eddy, who know well how to take advantage of it; and without its assistance, when in an open boat examining the coasts of the islands, I should have been, upon many occasions, retarded and benighted. The currents, upon some of the coasts, and in every sound, are so powerful, that no vessel can stem them even with a strong wind, and are impassable but with the course of the tide. But, by rowing from bay to bay, and favoured by these eddies, we often passed such streights, when the current in the channel was running violently in the opposite direction. The only difficulty was in turning the promontories, where we had to encounter the current, which sometimes cost the sailors excessive labour, though there, its force, close by the shore, is half broken.

These eddies take place in every bay, whether the sound be broad or narrow, or the current swift or slow; and regularly reverse their course, upon the changes of flood and ebb. Their swiftness is always in proportion to the swiftness of the current, but much inferior. They run swifter in a small bay, than in a large one. In some places, I found their velocity to be one half; and in others, not above a third or fourth of that of the current.

The most probable cause of this phaenomenon appears to be as follows: The current rushing past a promontory, puts into motion and carries along with it, part of the water in that corner of the bay. This must occasion a draught of water over the whole bay, towards that corner; or a stream in an opposite direction to the current; and the water carried away by the current, from that corner of the bay, must be supplied by an influx of water into the bay, at the opposite promontory.

Whirlpool.—The island of Scarba lies at the north-east end of Jura, and the sound between the two islands is remarkable for a furious commotion in the sea, at certain times of the tide. It is called the gulph or whirlpool of Coira-bhreaggan, commonly pronounced Cory-vrekan. The sound is about a mile broad, and the whirlpool is upon the Scarba side, not far from the shore.

Soon after the flood has entered the sound, the sea at this place appears in great disorder. It boils,

foams,

foams, and passes away in successive whirls. The commotion increases till near the fourth hour of flood, when it becomes most impetuous. It then boils from the bottom, and throws up every thing that is moveable by water. The waves are tossed up with a loud roar, and to such a height, that they fly broken from it, and white, for several miles, before they are dispelled.

Soon after the fourth hour of flood, these violent motions gradually abate; and, for near an hour before the tide ceases to flow, their place is not to be known, but becomes as smooth as the rest of the sound. Soon after the return of the ebb, however, they are again repeated, increasing and diminishing at the same times, and in the same manner, till the last hour of ebb quiets their disorder.

The inhabitants say, that, when this whirlpool is in its fury, its attraction extends to a great distance; which renders it dangerous for any vessel to enter the sound. But, for above an hour at high and low water, any boat may pass near it, and even over it, with safety. They tell of a tall ship, abandoned by the crew, upon her approach to the whirlpool, that was swept down by it, and immediately cast up again with the shells and sand from the bottom: likewise, of several such accidents befalling other vessels; but I found none of them that appeared properly authenticated.

The cause of this extraordinary phaenomenon seems to be a perpendicular submarine rock, standing in the course of the current, as it passes through the sound. The opposition it gives, may occasion the gyrations in the water, its rising from the bottom, and the breaking and throwing up of the waves, which always happens in the most forcible manner during the highest tides, and when the current is strongest. It likewise accounts for the smoothing surface, when the flood is at its height; when it becomes covered with such a depth of water, as renders the opposition it gives to the current below imperceptible above. But it accounts not so well for the same smoothness, at the time of the lowest ebb. Another cause however is to be observed, that may occasion both these appearances; the diminished force and almost stagnant state of the tide at both periods.

Climate.—The climate of Jura is very different from that of Isla; and, though in its immediate neighbourhood, not near so mild. The lofty mountains with which Jura is crouded from end to end, occasion this remarkable difference. These mountains are covered with snow, till summer is far advanced, and in all seasons of the year distress the island with boisterous winds and impetuous floods. Being desirous to survey the prospect from the height of these mountains, and in hopes of discovering upon them some singular plants and fossils, I resolved to attempt getting to the summits of the two highest, called the paps of Jura, though made acquainted by the people of the country of its being no easy undertaking.

Experiments.—The execution also of two experiments, at so great a height in the atmosphere, made a considerable part of the design. The one was, to measure the height of the highest mountain, by performing the Torricellian experiment at its base, and upon its summit; which we chose rather to do, being provided with a proper apparatus for the purpose, than to trust to a portable barometer carried to the top of the mountain.

The other experiment was to be made with the thermometer. Several years ago, M. Mairan and the other French academicians, discovered by experiments, that boiling water is not of the same degree of heat at the top of a mountain, that it is at the bottom; but, by the thermometer, is visibly colder upon the mountain, than upon the plain. An additional and important fact, however, remained still to be discovered. What is the height of the column of air that corresponds to the fall of one degree of the thermometer in boiling water? The great height of this mountain in Jura, and our proposed mensuration of it in the exactest manner by the barometer, at the same time that the thermometrical experiment was performed, gave some hopes of solving this curious question with some degree of precision.

Upon the 27th of June, we filled a barometer at the shore of the sound of Isla, at seven o'clock in the morning; and being placed at the level of the sea, the mercury stood at twenty-nine inches and seven tenths. At ten o'clock it stood at the same height, when we set off in order to ascend the mountain, which is one continued steep from that part of the shore. Some Highland gentlemen were so good as to go along to conduct us. And a box with barometrical tubes, a telescope, a large kettle, water, fewel, provisions, and a couple of fowling-pieces, loaded seven or eight servants.

The first part of our progress lay through deep bogs, from which we sometimes found it very difficult to extricate ourselves. We then came to a chain of small but steep hills, where the heather struck us to the breast, and which were cut every where with deep glens and gullies, which we could not have ascended on the opposite side, without the assistance of the junipers and strong heather, with which they were covered. We next travelled along the rocky skirts, of three or four extensive hills, and came to a small gloomy lake, at the foot of the highest mountain. Upon this side, which was to the south, we found the ascent impracticable, being so abrupt and full of precipices, which obliged us to make a circuit to the east. Here we had before us, a very steep and continued ascent of about one thousand five hundred feet of perpendicular height, and composed entirely of loose rocks and stones. They lay upon the side of the mountain, like a great stream, and upon the least motion, gave way all about us, which made our progress both tedious and dangerous. With great difficulty, we made our way against these hurling ruins of the mountain; and at last, after an ascent of seven hours, with excessive fatigue, we gained the summit.

It was now five o'clock in the afternoon, the day was serene, not a cloud in the firmament, and the atmosphere uncommonly clear; so that the view we now enjoyed, of the earth and the seas below, made us forget the toil of our ascent. Every way we turned, we had a prospect of sea and land, as far as the eye could reach. The sea in many places running out to the sky, and in others, terminated by lands and islands of various shapes, forming a very singular and grand horizon.

Prospect.—On one hand we had a thousand hills; the whole alpine country of Argylshire, the ancient Albion. Here only, our view was intercepted, and that only by mountains at the distance of above fifty miles. In another quarter, we saw distinctly the whole of the Hebrides, and Deucaledonian ocean. Southwards, the vast promontory of Cantire lay under our eye; and beyond it, in one view, all the west of Scotland rising to the great mass of mountains in the head of Clydesdale and Nithsdale: in another view, the spiry summits of Arran, and the whole Irish sea, with its shores, to the Isle of Man. From the south to the west, the north of Ireland lay as a plain before us, further than the eye could reach. The impetuous strait between the Mull of Cantire and the Fair Head, with its lofty cliffs, was at hand; through which the Irish sea is filled every tide, by the pouring in of the Atlantic. The promontory of the Giants Causeway appeared near and distinct; and beyond it, the high land of Inis-huna, the north extremity of Ireland; beyond this, to the Hebrides, nothing but air and ocean.

The emotions in the mind of the beholder, arising from the grandeur of this scene, are not to be excited by any description. The extent of prospect from this mountain is indeed surprising, not much under three hundred miles, south and north. But the curvature of the earth is here greatly overcome by the elevation of the spectator, and the great height of the distant lands. Nothing else could render the Isle of Skye and the Isle of Man at the same time visible. At three such views, the naked eye might extend from the one extremity of Britain to the other. To stretch the eye over so many different seas, over such a multitude of islands, and such various countries, in different kingdoms, is perhaps a scene, that can nowhere be beheld in Europe, but from the summit of Jura.

During the time that our fire was kindling, we constructed a barometer, when the mercury stood at twenty-seven inches and one tenth. Fahrenheit's mercurial thermometer was then put into the boiling water, in a kettle which was made for the purpose, and, after many repeated immersions, was found to stand constantly at two hundred and seven degrees. We left the summit of the mountain at seven o'clock, and left it indeed with regret, having been so much delighted. We descended, not without some difficulty and danger, upon the west side, where the mountain is very abrupt; and about midnight arrived upon the sound of Isla, at the place from which we set out.

Here we again repeated our experiments. The same barometrical tube was filled, and at one o'clock in the morning, the mercury stood, at the level of the sea, at twenty-nine inches and seven tenths; the same height precisely at which it stood the preceding morning at seven o'clock. And, as the air and weather had been altogether serene, without the least perceptible alteration during the intermediate time, there was reason to think that we had now the altitude of the mountain with as great exactness as it could be taken by the barometer.

We at the same time put the thermometer into boiling water, and, after repeated immersions, it was observed to stand constantly at two hundred and thirteen degrees. The thermometer employed, was one constructed by Professor Wilson at Glasgow, and we were therefore assured of its accuracy. The water carried to the top of the mountain, was from a pure perennial spring on the shore of Jura; and the water of the same fountain was employed in the repetition of the experiment.

From these experiments, therefore, it appears that a column of air of the height of this mountain, is equal to two inches and six tenths of mercury. And assuming Dr Halley's calculation of ninety feet for each tenth, the perpendicular height of the mountain turns out to be two thousand three hundred and forty English feet above the surface of the sea, which is just three hundred feet less than half a measured mile.

The difference in the heat of boiling water at the summit, and at the bottom of the mountain, appears from these experiments, to be equal to six degrees in Fahrenheit's thermometer. And the height of the mountain, divided by this number, gives three hundred and ninety feet for each degree.

Inhabitants.—The island of Jura contains about four hundred and thirty-seven inhabitants, so that upon the above supposition of its consisting of one hundred and fifteen thousand acres, it contains two hundred and sixty-three acres for each person. A most melancholy proportion! To find a parallel to it, we must go to the wastes of America.

Longevity.—The people live mostly on milk, butter, cheese, fish, mutton, and venison, and use very little vegetable aliment. Notwithstanding this, they appear to be rather longer lived than many of their neighbours. The accounts of one Macraen, who died here in the last century at the age, it is said, of a hundred and forty, are still fresh among the inhabitants. The last baillie of Jura was eighty-seven, and his father is said to have been a hundred and ten. Many such remarkable instances of longevity I heard related, but had not the opportunity to have them sufficiently verified. We will not be far wrong, however, in concluding from them, that the inhabitants of Jura are in general a long-lived people.

Diseases.—They are not remarkable, however, for a greater proportion of health than their neighbours. Diarrhoeas and inflammatory fevers are rather more frequent here, than in the islands where the inhabitants live more upon vegetable food; and the small pox is nowhere attended with greater mortality. The soil of Jura is extremely dry, especially in all the inhabited places near the sea. Nothing can be purer than its air, which is kept in perpetual motion by the mountainous nature of the country. Its waters, likewise, are most salubrious, and the manner of life among the inhabitants, the same as in the other islands. In their diet alone, they differ; and to this difference, may be ascribed any greater prevalence of the above diseases, or their greater degree of mortality. Grain is here in greater scarcity than in the other islands; and the people want gardens to supply them with vegetables. Of late years, indeed, the cultivation of potatoes has greatly enlarged the proportion of their vegetable aliment; and, by pretty certain observation, has added greatly to the health of the people.

A DESCRIPTION

OF

AN EXTRAORDINARY DISEASE IN JURA.

In the Highlands in general, there are fewer people either lame or decrepit, than perhaps in any other country in Europe. But in Jura, the cripples are remarkably numerous; owing to a very singular disease with which the island is infected.

This disease arises from a worm lodged under the skin, that penetrates, with exquisite pain, the interior parts of the limbs. It is termed, in the Gaelic language, Fillun; and is generally lodged either in the knees or ancles.

It is first discernible very deep, as the patients themselves say, at the bones. Whether it really affects or penetrates the bones I could not positively learn, though it is very probable, from the extreme pain which it occasions; but in a little time, it makes its way through the cartilages, tendons, and muscles, and penetrates the skin with several small ichorous orifices.

The worm disappears soon after this stage of the disease, which, when suffered to come this length, never fails to cripple the patient for life. Both men and women, children and adults, are equally subject to it; and the intense pain with which it is accompanied, sometimes destroys the appetite and spirits, and occasions death.

The worm itself is about half an inch long. It has a white head, with a sharp bony rostrum; and the body is of a reddish colour, and of a compressed shape, with a row of feet on each side.

The only cure known for this disease, is the root of a plant, and the marrow boiled out of beef bones, or if that cannot be had, they make use of goat tallow in its place. The root is pounded and mixed with the oleaginous substance, and the mixture applied in the form of a poultice, as hot as the patient can bear it. The application of this remedy, before the worm breaks the skin, kills it within, and cures the patient. Yet, even of those who are thus recovered, most of them have their limbs in some degree lamed or distorted; and the disease is so frequent, that there is not a farm upon Jura, but there are two or three persons to be found who have suffered by it.

The plant whose root is thus used for the cure of this disease, is the Pedicularis *palustris* of Linnaeus, or great marsh Red Rattle, which has been long known as an officinal plant; but this remarkable virtue which seems to reside in it, has been discovered and known, only by the inhabitants of the Hebrides.

The human body serves as a nidus to a variety of animals, especially to the Vermes, such as the Lumbricus, Taenia and Ascaris; and of these, the following species are the most common to be met with.

LUMBRICUS *terrestris*, Linn.
ASCARIS *vermicularis*, Linn.
lumbricoides, Linn.
TAENIA *solium*, Linn.
vulgaris, Linn.
lata, Linn.
canina, Linn.

These seven species, however, are confined to the intestinal canal, and have never been found lodged in any other part of the body.

There are also two insects which are known to deposite their eggs under the human skin, and there, by breeding their young, to produce diseases.

Of these, the Acarus *siro*, Linn. has been demonstrated to be the cause of the itch.

The other is the Pulex *penetrans*, Linn. which is the Chego so well known in the West Indies, whose eggs, when lodged in the feet, if not attended to in time, produce foul ulcers, which sometimes occasion death.

The lodgement and generation of the above seven species of vermes in the Primae Viae, is a common appearance, and the manner of their introduction obvious. The lodgement also of the eggs of these two species of insects under the skin, by an external puncture, is not at all extraordinary. But the appearance of a worm in the internal parts of the extremities of the human body, is much more singular and surprising: and of this, there are only two instances generally known to naturalists and physicians, to which the Fillun may be now added as a third.

The one is the Gordius *medinensis*, Linn. This worm, which is yet known to be a native only of Africa and Asia, infects the negroes when newly transported to the West Indies. It is of great length, and usually lodged in the muscular flesh of their limbs. Like the Fillun it comes to make an orifice, where, by caution, it may be extracted; but if it happen to be broke, the consequence is an incurable ulcer. The great resemblance of this species to the Gordius *aquaticus* Linn., an animal to be found in many of our stagnating pools in Scotland, gives room to think it an inhabitant of the same element; and that its eggs or embryos are admitted into the body, by drinking of the water that contains them.

The other, is the Furia *infernalis* Linn.; a most extraordinary and horrid animal, discovered in Bothnia by Dr Solander. A subtile worm that falls from the air, as it is said, upon the bodies of men and cattle, which it instantaneously penetrates, and occasions immediate death, with the most intolerable torment.

These are all the animals infesting the interior parts of the human body, of which we have any exact description; but the Fillun seems essentially different from them all. By the accounts given of it by the natives, it is no insect, but one of the vermes, and seems to approach nearer in its character to the Furia, than to any other of the Linnaean genera. By their joint opinion, however, it does not make its way into the joints by any external perforation, in the manner of the Swedish animal discovered by Dr Solander.

Of all these animals, the only instance exactly analogous to the Fillun, is that of the Gordius *medinensis* of Africa. In both cases, it is most probable, that the embryos of these vermin are admitted by the aliment; but their progress from the alimentary duct to the extremities, is a curious and surprising phaenomenon.

PLANTS.

I.

SCIRPUS *tetragonus,* culmo tereti levi vaginato, sub vagina tetragono striato, spica ovata sexflora.

Scirpus equiseti capitulo majori alter. Scheuchz. gram. p. 361. tab. 7. f. 17?

DESCRIPTION.

Root.—The root is perennial and fibrous, throwing out a tuft of stalks, usually from three to eight in number, intermixed at the base, with a number of short brown decayed leaves.

Stalks.—The stalks are simple, erect, solid, round, smooth, and of unequal height from the same root, generally from three to ten inches.

The stalk for about two inches next the root is closely surrounded with a green sheath, which throws out no leaf, but is truncated at the top. And so far as this sheath extends, the stalk is quadrangular and striated.

The plant, properly, has no leaves, but throws out several infertile stalks, which bear no spike.

Spike.—The spike terminates the stalk, and is oval, brown, not perfectly erect, but bended to one side. It is imbricated with oval acute scales, and contains six or sometimes seven flowers.

The lowest scale of the spike is larger and more obtuse than the rest, nearly as long as the spike itself. It almost surrounds the spike at the base, but contains no flower under it, and serves instead of a bractea or floral leaf.

Flower.—The flower has three chives, and the style has generally only two summits. The seed is surrounded at the base, with a number of small white hairs, which are shorter than the scales of the spike.

OBSERVATIONS.

1. This plant was found in a boggy soil near the sea shore in Jura, and is not mentioned either in Ray's Synopsis or Linnæus's system. The description given by Scheuchzer does exactly answer the plant, but his figure exhibits more flowers than are to be met with in its spike, which are pretty constantly only six in number. Though a separate species, a nicer attention is required to distinguish it from other plants of the genus, than what has been usually paid by botanists to the gramineous tbire.

2. It partakes of the habit and characters of the Scirpus *palustris*, *cespitosus*, and *acicularis*. of Linnæus, but of these, it approaches nearest to the *palustris* from which, likewise, it is essentially different. The *palustris* is more than double its size; and the spike larger, with a much greater and indefinite number of flowers, while those of the *tetragonus* are determined to six in number. The stalk of the *palustris* is declined, of a compressed shape, but round, so far as the sheath extends. Whereas the stalk of the *tetragonus* is erect, perfectly round, and so far as the sheath extends, distinctly quadrangular.

II.

JUNCUS *sylvaticus*, foliis planis pilosis, umbella supra decomposita floribus subsessilibus. Huds. angl. p. 132. n. 11.

Juncus foliis planis pilosis, corymbo decomposito floribus aggregatis sessilibus. Lyons Fascic. p. 31.

Gramen nemorosum hirsutum latifolium maximum. Raj. syn. p. 416. n. 4. Raj. hist. 1292. Buddl. hort. sicc. vol. 12, fol. 23.

Broad leaved hairy Wood Grass.

III.

β JUNCUS *montanus* panicula fastigiata subtrifida decomposita sparsa erecta.

Gramen hirsutum latifolium minus. Bauh. pin. p. 7. n. 2. Theat. p. 102. fig. 2. Moris. hist. 3. sect. 8. tab. 9.

Hoary Mountain Rush.

OBSERVATIONS.

1. The Juncus *sylvaticus* is common in all the woody parts of the Hebrides, and is indeed the most frequent plant in all the woods of Scotland. It is improperly considered by Linnæus as a variety of his Juncus *pilosus*, and is very well distinguished by Mess. Hudson and Lyons, as a distinct species from that plant.

2. The Juncus *montanus* is a variety, not of the *pilosus*, as Linnæus has it, but of the *sylvaticus*. It was first considered as such by Caspar Bauhinus, and the figures given of it by him and Morison, are both characteristic enough of the plant. It varies remarkably from the *sylvaticus* in the place of its growth, which is no doubt the cause of any other differences to be observed between them. The *sylvaticus* grows always under the shade of rocks or trees, but the *montanus* was found on the very summit of the most westerly mountain in the island of Jura, at the height of two thousand three hundred and forty feet above the level of the sea, on the 27th of June, on which day, it had unfolded its first flowers. It was since found on the top of a mountain, of about the same height, on the 17th of July, when its flowers had begun to decay.

IV.

Polygonum *viviparum* caule simplicissimo monostachyo foliis lanceolatis. Linn. sp. p. 516. n. 3.

Bistorta alpina minor. Bauh. pin. p. 192. Raj. syn. p. 147. n. 2.

β Bistorta minima alpina, foliis imis subrotundis, et minutissime serratis. Raj. syn. p. 147. n. 3.

Alpine Bistort.

OBSERVATION.

The plant here marked β was first discovered by Mr Lhwyd, upon the mountains of Wales, and recorded in the Synopsis as a species. Haller found it in Switzerland, and in his Iter Helveticum an. 1738, it is considered only as a variety, which was evident also from its appearance in Jura. It was there, only two or three inches high, and the radical leaves were broad, and almost heart-shaped, whereas those of the *viviparum* are commonly linear or lanced. But the leaves of both, may be observed to be minutely serrated.

V.

Andromeda *polifolia*, pedunculis aggregatis, corollis ovatis, foliis alternis lanceolatis revolutis. Linn. sp. p. 564. n. 5.

Ledon palustre nostras arbuti flore. Raj. syn. p. 472.

Marsh Cistus or Wild Rosemary.

DESCRIPTION.

Root.—It has a large repent perennial root, sometimes three or four times longer than the height of the plant. The branches of the root are round, rigid, and covered with fibres.

Stem.—The stem is round, rigid and smooth. It is perennial and shrubby, though not above half a foot high, and about the thickness of a crow-quill. It is divided into several sparse branches.

Leaves.—The leaves are alternate; four of them compleating a spiral round the stem. They are lanced, with an entire, but reflected margin, green above, with whitish veins, and white below

low, with veins of a green colour. The whiteness on the under side is owing to a fine tomentum, which is easily separable from the leaf. The footstalks are very short and crooked, and have no stipulæ.

Florescence.—The flower stalk, about an inch long, and of the same reddish colour with the empalement, bears a single flower, and is so much bended, that the flower is pendulous.

The branches sometimes bear only one flower, but generally, there are two, three, or four flowers, at the extremity of each branch.

The flower stalk is surrounded at the base, with a tetraphyllous involucrum or wrapper, the small leaves of which, are oval, acute, concave, and whitish, but of an unequal size, two that are opposite being larger than the other two. When a branch bears two or three flower stalks, the involucrum of one is composed of four leaves, that of the second has three, and that of the third has only two leaves.

Empalement.—The empalement is placed under the fruit, and is persistent and pentaphyllous. Its leaves are oval, acute, of a red colour, and much shorter than the flower.

Flower.—The flower consisting of one inflated petal, is large for the size of the plant, and of a delicate flesh colour. It approaches to a globular shape, but is evidently pentagonal, much contracted at the orifice; and there divided into five small reflected segments.

Filaments—The ten filaments are not fixed to the petal, but to the receptacle.

Pistil—The germ is brown, with a black border at the base. The style white and persistent. The summit obtuse and of a shining brown colour.

OBSERVATIONS.

1. It was found beginning to flower the 27th of June in the deep turf bogs of Jura, with its roots creeping for a great length in the Sphagnum *palustre*, Linn. It is a shrub of the smallest size, but of the greatest beauty, and would be a great ornament to gardens, if it would answer with cultivation. Like all the other plants which grow naturally in the above situation, it would probably be difficult to bring it to perfection. The only method to succeed, would be by an exact resemblance of its natural soil, which is wet, spongy, and pervious to the last degree.

2. There is a figure of the plant given by Linnæus, as it grows in the Alps of Lapland, which has only one flower, proceeding, not from the extremity, but from the base of a branch. But in the Jura

plants, the flowers were aggregated; two, three, or four of them springing from the same place, and always from the extremity of the branches.

3. The empalement and flower of the Erica, are each, divided into four segments, those of the Andromeda into five; and the former possesses only eight filaments, while the other has ten. These are the only characters that can give a foundation for separating the Erica and Andromeda. In all other things, they are perfectly similar, and evidently constitute but one natural genus. Yet these distinctions in the number of the parts, are very constant, and define the one genus from the other, in a manner sufficiently accurate for an artificial system.

VI.

Rosa *scotica* germinibus globosis, caule aculeatissimo, pedunculis superne villosis, calycibus germine petiolisque glabris.

Rosa (scotica) caule petiolisque aculeatis, foliis pennatis, foliolis apice incisis, fructu globoso. Miller. dict. Rosa. 5.

Rosa pimpinella minor scotica, floribus ex albo et carneo eleganter variegatis. Pluk. alm. 322. Raj. syn. p. 455.

Rosa ciphiana seu Rosa pimpinellae foliis minor nostras, flore eleganter variegato. Sibbald. Scot. illustrat. Pars II. Lib. i. p. 46. tab. 2.—Ibi primum edita an. 1674.

β Rosa pimpinella minor scotica, flore livide rubente. Miller. dict. Rosa 5.

Rosa alpina, pumila, montis rosarum, pimpinellae foliis minoribus ac rotundioribus flore minimo lividè rubente. Cupan. hort. cathol.

The Ciphian Rose.

DESCRIPTION.

It is to be found from half-a-foot to a foot and an half high. Its stems and branches are more thickly covered over with prickles than any other species of rose; and the prickles are streight and extremely sharp. The footstalks are smooth. The leaves are composed generally of seven smaller ones, which are smooth, oval, serrated, and obtuse. The flower stalks bear only one flower, and are prickly towards the base, but villous towards the calyx. The leaves of the calyx are undivided, but a little denticulated. The flowers are large for the size of the plant, and finely variegated with red and white. The fruit is is round and smooth.

OBSER-

OBSERVATIONS.

1. Several parts of the shores of Jura and Isla are highly ornamented with this beautiful little rose, which is in full flower about the end of June, upon the stony beach. It was first discovered, about a hundred years ago, by Sir Robert Sibbald, in West Lothian, by whom it was described and figured; but approaches so near to the Rosa *spinosissima* of Linnaeus, that it has been often considered only as a variety of that plant. The two plants, however, differ considerably in their habit and characters; these differences they constantly preserve wherever they grow, nor do they ever run into one another.

2. The flower of the *spinosissima* is invariably white, but that of the *scotica* elegantly variegated with different shades of white and red. A variegated flower is often indeed the consequence of culture, and the presumption of a variety; but this can scarcely be admitted in the present case. The *scotica* produces its variegated flowers in the wastes and wilds where it naturally grows; and upon many thousand plants of it observed in Isla and Jura, there was not a flower to be discerned of a different colour. It has been preserved for its beauty, and cultivated for a century in the gardens of Scotland; but no alteration has been produced in the colour of its flower, though the plant has changed considerably in

other respects. By this cultivation it has lost much of its asperity. The number of prickles upon its stems and branches are greatly diminished, and its flower stalks are become much longer and perfectly smooth. And by these characters, it is suspected, but erroneously, to be the plant delivered by Linnaeus, with the name of Rosa *pimpinellifolia.*

3. The variety β grows naturally in Italy, and is sometimes to be observed in our gardens.

VII.

COCHLEARIA *groenlandica.* foliis reniformibus carnosis integerrimis. Linn. sp. p. 904. n. 4.

Cochlearia rotundifolia. Raj. syn. p. 302. n. 2.

Groenland scurvy grass.

The leaves of this plant are not so perfectly entire, as is expressed in the Linnaean name. The radical leaves have an obscure notch at the point, and two others opposite to each other on the sides of the leaf. The leaves on the stem almost surround it, and are irregularly quadrangular. Each cell of the seed vessel contains three seeds.

It was found in the channel of some small springs upon the mountains of Jura. It is far more pungent to the taste, and by some late trials in Scotland, appears to be a more powerful antiscorbutic than the Cochlearia *officinalis* Linn. But cultivated in a garden, it enlarges greatly in size, and turns milder to the taste.

VIII.

Pteris *britannica* frondibus subbipinnatis; foliolis suboppositis lanceolatis pinnatifidis; lobis oppositis ovatis obtusis integerrimis.

Filix mas vulgari aliquatenus accedens pinnulis rigidioribus et acutioribus quarum margines lineis seminalibus ex tuberculis pulverulentis compositis observantur. Buddl. hort. sic. vol. 3.

Filix non ramosa nostras, pinnulis brevibus acutioribus integris, nonnihil falcatis, punctis ferrugineis ad oras pulverulentis. Pluk. amalth. p. 91.

Filix fontis admirabilis ad marem vulgarem non ramosum accedens non dentata. Bauh. hist. vol. iii. p. 731. Raj. hist. p. 145.

DESCRIPTION.

Stalk.—The stalk is of a green colour, erect, and to be found from a foot and an half, to three feet in height.

Foliage.—The foliage is feathered, and is once and an half pinnated. The whole plant is of an oblong lanced figure; the foliola, or secondary leaves, being longest about the middle of the stalk, decreasing gradually towards both extremities.

The secondary leaves are placed in pairs, but not exactly opposite to each other. They are of a lanced figure, half pinnated, but entire, and sharp towards the extremity.

The lobes of the secondary leaves are opposite, oval, obtuse, and entire; the inferior ones, or those next the stalk, being largest.

Fructification.—The fructification consists of round points, disposed in a single line round the margin of the lobes. This line extends no further than where the lobes are divided, and does not reach to the middle nerve of the secondary leaf. Before the scale of the empalement bursts open, the round points of the fructification are distinct and separate; but after this they unite by expanding, and form one continued line of rusty-coloured powder, as in the other ferns.

OBSERVATIONS.

1. Of the numerous genus of Pteris, this plant makes only the third species hitherto discovered in Europe. It was found in the hollow sheltered parts of Jura, intermixed with the common fern, and has since been discovered near Oxford by my friend, the Reverend Mr Sheffield, Fellow of Worcester College.

2. It is a plant which has very much escaped the notice of botanists, by its near resemblance to the Polypodium *filix mas*, Linn. or common male fern, and it was by accident I happened to distinguish them. By laying hold of a bunch of fern, in clambering up a precipice, the marginal fructification of this plant catched my eye, which shewed it to be very different from the common fern. But when this is once known, the two plants are easily distinguished by their external habit; the Pteris being of a less size, with a more narrow and less divided leaf, and of a brighter green colour.

IX.

Trichomanes *tunbrigense*, frondibus pinnatis: foliis pedatis; foliolis oblongis obtusis serratis.

Trichomanes frondibus pinnatis: pinnis oblongis dichotomis decurrentibus dentatis. Linn. sp. p. 1561. n. 6.

Adiantum petræum perpusillum anglicum foliis bifidis vel trifidis. Raj. syn. p. 123. n. 2.

Adianthum radicosum humisparsum, s. Filicula pellucida nostras coriandri foliolis molicellis globuliferum. Pluk. phyt. T. 3. f. 5.

Adianthum radicosum erectius foliolis imis bisectis, cæteris vero integris tenuissime crenatis. Pluk. phyt. T. 3. f. 6.

DESCRIPTION.

Root.—The root is filiform and fibrous. It creeps horizontally to a great length, and shoots forth single stems, at the distance of half an inch, or an inch, from each other; yet sometimes two or three stems spring from one place. By this manner of growth, it forms an extensive turf, thickly matted with its roots and stems.

Stalk.—The stalks are filiform, declined, winding, and vary between one half and two inches in height, bearing a feathered foliage.

Foliage.—The stalk is feathered, with secondary leaves, which are alternately reflected and sessile; and these, again, are subdivided, for the most part, into two or three smaller leaves, or lobes, which are oblong, serrated, and obtuse, and each has a middle nerve, of a blackish colour. The foliation of the foliage is circulatory.

Male flower.————

Female flower.—The female flowers are solitary; standing upon flower-stalks in the forks of the leaves. The flower stalk is filiform, extremely short, and so reflected, that the flower is screened by the foliage.

Cup.—The empalement is of a compressed shape, but prominent in the middle, and is composed of two valves, which are oval, obtuse, and green. After the time of flowering, these valves contract closely together, and serve as a cover to the seeds.

The flower has no kind of petal.

Pistil.—Instead of pistils, the empalement contains a great number of small spherical germs, which compose one round mass; but there is no style or summit visible to the naked eye.

Seeds.—The seeds are numerous and gymnospermous, and fixed to a columnella, or little pillar, in the middle. When ripe, they are round, and of a brown colour.

So far as the microscope could discover, the seeds are destitute of any cotyledon.

OBSERVATIONS.

1. This plant, which is one of the most rare European species, has hitherto been detected only in Britain and Italy, and was found in a gully, growing among the heath, in ascending the mountains of Jura.

2. It appears to be of an alpine nature, and is impatient of dryness. On which account, it vegetates chiefly throughout winter, like the mosses, and perfects its seeds early in summer.

3. There is no good description of this rare plant extant, and the three figures of it that are given by Boccone, Plukenet, and Petiver, are all of them very imperfect. Plukenet, in his Phytographia, Tab. 3. fig. 6. represents a single stalk of the plant, more erect than usual, in which the leaves are either entire, or only bifid, and of a large size. This appearance of the plant is sometimes to be observed, and is different from its most common habit; but,

so far from being a different species, it cannot even be admitted as a variety.

4. *Structure.*—There is a singular structure in all the plants belonging to the two orders of mosses and flags, by which they are peculiarly distinguished. The foliage of the ferns, and of most other plants, is of a nervous structure; but the foliage of the mosses and flags is destitute of nerves. Sometimes, indeed, their leaves have a middle nerve; but it is rarely branched, as in other plants. The substance of their leaves is not vascular, but apparently parenchymous. It appears always through glasses, and frequently to the naked eye, a congeries of points or globules, without nerves, or any other kind of vessels whatever. This is the structure of the Trichomanes *tunbrigense,* and by this it is remarkably distinguished from the ferns, and allied to the flags.

5. There is another singular property in the mosses and flags, which is well known to those who have been conversant with these plants. Though never so much dried and shrivelled, and even after they have been preserved in a cabinet for many years, upon being immersed in water, they resume their former figure and colour, and even their vegetative faculty. This is the consequence of their peculiar structure, described above. They receive not their nourishment from the root, by a continuation of vessels, like other plants, but imbibe it, like a sponge,

at all parts of their surface. This also is so much the case with the Trichomanes *tunbrigense*, as shews it to be naturally and intimately connected with these two orders of plants.

6. *System.*—It is a plant which differs widely from all the other species of Trichomanes, and indeed from the whole order of ferns. It seems entitled to claim a separate genus, as by its characters and habit it holds an intermediate place between the ferns and flags. From its characters, it could never be judged to be a Trichomanes; and has never been seen by Linnæus in its recent state, otherwise it would, no doubt, have been more clearly defined in his system.

7. The only important character in which it agrees with the ferns, is, the circulatory order in which it unfolds its leaves, which it has in common with most of the other plants of the capillary tribe. In all other things, it widely differs from them, and even this property it also has in common with several of the palms.

8. Both its internal structure and its external characters refer it to the flags, and detach it from every other order of plants. And in an artificial, as well as in a natural system, it seems to constitute a genus between the Targionia and Jungermannia of Linnæus. The greatest blemish of any system is an ex-

tra-generical plant, which is the case at present of the Trichomanes *tunbrigense* in the system of Linnæus.

9. Muscus terrestris indicus platyceros filicem referens. Moris. hist. 3. p. 628. Sect. 15. Tab. 7. fig. 50. appears from its habit to be a plant perfectly congenerical with the Trichomanes *tunbrigense.*

X.

Bryum *britannicum*, antheris erectis pyriformibus, collo contracto, ore ciliato, surculis simplicibus, foliis lanceolatis.

Bryum ampullaceum, foliis serpylli pellucidis, collo crassiore. Dill. musc. p. 344. T. 44. f. 4.

Bryum erectis gigartinis capitulis, foliis serpylli pellucidis obtusis. Raj. syn. p. 93. n. 5. Tab. 3. f. 2.

Bryum trichoides palustris aestivus, capitulis nigris erectis, collo luteo fimbriato. Richards. Raj. syn. ibid.

OBSERVATIONS.

1. It was found in boggy ground, among tall heather, upon one of the hills, in ascending to the paps of Jura, at about one thousand two hundred feet of perpendicular height above the sea.

2. It is a plant of which we find no notice taken by any botanical writer except Ray and Dillenius. It seems to have been hitherto discovered only in Britain, and is one of the rarest plants of the genus, that has yet occurred to the British botanists.

3. It is sufficiently distinguished by Dillenius's description; and his figure is much better than that in Ray's Synopsis, which represents the leaves too oval, and the ciliae or hairs at the orifice of the anthera of too large a size, and too few in number.

4. It appears to be a plant of an alpine nature, and differs from most of the other species of Bryum in the lateness of its growth. It vegetates vigorously, and produces its flowers in summer, when most of the other Bryums are decayed. On the 27th of June, only a few of its antherae were blown, the greater part being very young, with their calyptrae or caps still remaining upon them.

5. It approaches in its habit and characters both to the Splachnum *ampullaceum* and the Bryum *pyriforme* of Linnaeus. Having no umbraculum, however, or umbrella, it cannot be referred to the Splachnum; and from the Bryum *pyriforme* it is distinguished, both by the shape of its anthera, and by its orifice being ciliated, which in the *pyriforme is* plain.

XI.

Bryum *laterale*, Surculis scopariis, foliis setaceis secundis, pedunculis lateralibus surculo brevioribus, antheris sphaericis.

DESCRIPTION.

Stems.—Its stems are from two to four inches long, and form a large, thick, soft turf, of a dark green colour. They are often simple, but generally divided about the middle, into two or three long branches, which are seldom again divided.

Leaves.—The leaves are perfectly setaceous, and being recurvated and bended to one side of the stem, give it that besom appearance, remarkable in the common Bryum *scoparium* Linn.

Flower Stalk.—The flower stalks are not placed at, or near the extremities of the stems, as in all the other species of Bryum; but laterally, that is, upon the sides, and near the middle of the branches. The flower stalks are erect, and scarce ever a quarter of an inch long, or three or four times the length of the anthera: they are sometimes single, but two or three of them are frequently aggregated, or spring from the same part of the branch. The flower stalk with the anthera seldom reaches within half an inch, and often not within an inch, of the extremity of the branch.

Flower.—The anthera is large, of a sphaerical figure, striated, and of a green colour; but, after it is blown, becomes reddish.

The operculum, or cover of the anthera is small, obtuse, and of a reddish colour.

OBSERVATION.

It was found upon a moist shady rock, in a deep gully, upon one of the hills of Jura, and must undoubtedly be a very rare plant; having escaped the researches both of Dillenius and Linnaeus. The turf it forms, resembles that of several other kinds of Bryum; but its antherae, though very peculiar, are not to be seen, because of their lateral position, till it is pulled up, and the stems are separated from each other, which may be the reason why it has so much eluded the eyes of botanists. It approaches nearest to the Bryum *pomiforme* Linn. but it is a quite different species.

XII.

XII.

LICHEN *quartzosus*, leprosus niger ramosus radiatus, ramis setaceis tenuissimis, tuberculis atris hemisphaericis.

DESCRIPTION.

It spreads itself in small round radiated spots, of a black colour, and seldom above a quarter of an inch in diameter, upon the surface of quartzy stones.

It is finely branched every way from the center, its branches being finer than a human hair, yet obvious enough to the naked eye.

In the older plants, the ramifications dissappear, by their coalescing into a thin black crust. Then, there is frequently to be observed upon them, small sessile tubercles of a hemisphaerical figure, and of a deep black colour.

OBSERVATIONS.

1. This minute plant has been observed upon the tops of several of our highest mountains in Scotland,

but always upon stones of quartz: and the Basanites *jurae*, a stone of the quartzy kind, of which the paps of Jura are composed, was found entirely covered with it in many places, especially on the very summits of the mountains.

2. It is a distinct species of Lichen, which we find not observed by any writer. Its younger spots, when the ramifications are distinct, have a very elegant appearance, when spread upon pure white quartz, and exactly resemble the arborescent appearances so much admired in the stones of Mocho. They are so fine as scarce to appear raised above the surface: they are not to be separated from it; and seem more like stains natural to the stone, than plants. The minuteness and delicacy of the plant seem to require a very smooth and hard surface for the place of its growth, which is perhaps the reason why it is so generally attached to quartz.

3. Of all plants hitherto discovered, it is one of the most minute, being scarce discernible from the substance of the stone upon which it grows; and may be considered as one of the links, that connect the vegetable world with inorganized matter. The little Bryum *truncatulum* of Linnaeus, the Hyssop of Solomon, according to Hasselquist, is a cedar compared to this plant.

XIII.

Lichen *islandicus*, erectus ramosus, ramis subdichotomis inosculatis convexis : marginibus ciliatis conniventibus.

Lichen foliaceus adscendens laciniatus : marginibus elevatis ciliatis. Linn. sp. p. 1611. n. 29.

Lichenoides rigidum, Eryngii folia referens. Dill. musc. p. 209. T. 28. f. 111.

Muscus islandicus purgans Bartholine. Raj. syn. p. 77. n. 90.

Muscus catharticus nostras. Sibbald, auctuar. p. 75.

Iceland purging moss.

DESCRIPTION.

This plant rises from one, to four inches in height, and is soft and flaccid when moist, but very rigid when dry. The stems and branches are much inosculated, and are so convex and concave, that by their margins being also frequently inosculated, they have rather the appearance of being tubular than foliaceous.

The branches observe a dichotomous division, with their forks or axillæ very obtuse. Their extremities are bifid and trifid, and the segments lance shaped and reflected.

The margins of all the stems and branches are more or less ciliated with small brown hairs. The plant towards the root is of a greyish colour, but towards the extremities of a blackish brown.

OBSERVATIONS.

1. This plant abounds greatly in the island of Iceland, and the uses to which it is there applied, were made known about one hundred years ago, by the two Danish philosophers Borrichius and Bartholine. The inhabitants there take it in the spring as a purgative; and in summer, after having dried it and reduced it to powder, they use it in their diet, being then deprived of its purging property. Linnæus observes, that by boiling in water, the plant loses its cathartic nature. But if it be capable after this, of becoming an aliment, it must be one of the poorest kind, fit only for people who are pressed by famine, and inferior even to the bark of trees.

2. Sir Robert Sibbald relates, that it grows in Stroma one of the Orkneys, and is there used as a purgative. It was found growing among the heather, at a great height upon the hills of Jura, being of an alpine,

alpine nature, and in several others of the islands, but I heard of no use to which it is applied.

XIV.

LICHEN *proboscideus*, foliaceus umbilicatus, ciliatus, scutellis pedunculatis: incisura a peripherio ad centrum perforatis.

Lichen foliaceus umbilicatus, peltis turbinatis truncatis perforatis. Linn. sp. p. 1617. n. 54.

DESCRIPTION.

The leaves are of a blackish colour on the upper side, of a brownish black below, and smooth on both sides. The lobes of the leaves approach to a round figure, and are remarkable for having edges finely ciliated or fringed with black hairs, many of which are branched.

The shields are black, and marked on the top with two or three small concentric circles, and possess the following essential character, which belongs to no other plant of this numerous genus. In each shield there is an incisure reaching from the margin to the centre, which gives it a reniform appearance. Notwithstanding this, it is a real shield or scutella, not a pelta, as it is considered by Linnæus.

The surface of some of the leaves is covered with small black farinaceous tubercles which contain the female fructification.

OBSERVATION.

Dillenius, the first botanist into whose hands this rare plant fell, and by whom it was first published, received it from Virginia and Pensylvania, where it grows upon trees. It has since been discovered in Lapland and Sweden, and was found for the first time in Britain, upon the most exposed rocks, near the summit of the paps of Jura, but in a very sparing quantity.

XV.

Chara *scotica*, inermis caulibus dichotomis glabris, ramulis verticillatis simplicibus scabris scruposis: terminalibus scopariis.

DESCRIPTION.

It has a creeping root, grows pretty erect, about three or four inches high, and is of a greyish green colour.

The stems are round, about the thickness of a needle, smooth, tough, naked between the joints, and divided in a dichotomous order.

The branches are verticillated at the joints of the stem; they are short and undivided, rough, brittle, and gritty to the touch when broke.

The branches at the extremities, are formed into pretty gross obtuse bundles resembling besoms.

OBSERVATION.

A few plants of it were found growing among the rushes, in one of the bogs of Jura. The place, though moist, was not watery, and the plant was growing erect in the air, and not under water like the other sorts of Chara. No fructification appeared upon it, yet its habit shews it unquestionably to be a Chara, of which we have hitherto found no vestige in any botanical writer.

XVI.

Ulva *fastigiata*, tubulosa fusca lubrica ramosa, ramis fastigiatis simplicibus teretibus inarticulatis.

Bundled Laver.

DESCRIPTION.

It is of a soft tender substance, and grows in tufts, from two or three inches, to a foot in length.

Its younger branches are always round, and about the thickness of a crow quill, but turn compressed when further advanced, and become twisted and wrinkled by age. While its tubular branches are entire, they contain a thin colourless gelatinous liquor, but they burst by age, and expand into a linear leaf.

It is a plant that assumes very different appearances. In the early period of itsgrowth, it consists only of one simple tubular filament. As it advances, it becomes a little branched, and by age, grows more and more so, with its branches sometimes very short, and at other times remarkably long. It generally, however, throws out a number of branches, which form a bundle, at some particular part of the stem.

OBSERVATION.

There does not appear to be either a description or figure of this plant in any botanical writer. It is very common upon the shores of Jura, and most of the other western islands, and grows in the basons of sea water left among the rocks upon the recess of the tide.

XVII.

Bombycina *jurensis*, caule continuato, ramis teretibus subpennatis: tuberculis lateralibus spongiosis, apicibus subsimplicibus denticulatis.

Fucus marinus purpurascens parvus, caule et ramulis seu foliolis teretibus. Raj. syn. p. 50. n. 50. Buddl. hort. sicc. vol. 1. fol. 16. fig. 3.

Jura Silk Weed.

DESCRIPTION.

Substance.—It is of a pretty firm substance, especially when dry, and without any articulation. By drying, it becomes black, but when held between the eye and the light, it appears a little pellucid and of a reddish hue.

Stem.—The stem is round, and about five inches long, of the thickness of a crow quill. It is continued distinct, from the root to the extremity, and not lost among the divarications of the branches.

Branches.—The branches spring alternately from the stem, and are themselves divided into smaller ones, placed somewhat in a pennated order. The smaller branches are a little denticulated, and their extremities are obtuse: these denticulations, however, are nothing more than the rudiments of younger branches.

Fructification.—The turbercles which are placed laterally, or upon the sides of the branches, seem to contain the fructification of the plant. They are round, sessile, rather spongy than versicular, and of different sizes, mostly about that of the head of a pin, but nothing satisfactory can be discerned in them by the naked eye.

OBSERVATION.

It is a very rare plant upon the shores of Scotland, and one specimen of it thrown up by the sea in Jura, was the only one found in all the western islands.

XVIII.

BOMBYCINA *deucaledonica*, ramis binatis secundis, tuberculis sessilibus axillaribus.

Deucaledonian Silk Weed.

DESCRIPTION.

Substance.—It is of a tough stiff glabrous coriaceous substance when recent, and of a dark brown colour, with a little transparency. When dried, it is of a deep black colour, perfectly opake, and so rigid, that the smaller branches and denticulations appear like so many prickles.

Stem.—The stem is continued distinct from the root to the extremity without being lost in the divarications of the branches. It is usually from one to two feet long, of a compressed shape, and smaller at the root than a crow quill. It is still more remarkably compressed at the forks of the branches, and is of a winding figure, assuming a different oblique direction from branch to branch.

Branches.—The branches proceed from the stem at different distances, from a quarter of an inch, to near two inches from each other, and between the branches, the stem is naked. The branches are of a compressed shape, and similar to the stem: some of them are simple, some denticulated, and others are further ramified.

Two branches generally proceed from the same part of the stem, and from the side of it, so that both branches look the same way: but one of them is always much longer than the other.

The younger branches are compressed, brown and pellucid, and beset with denticulations on each side, in a distichous and alternate order, but very short and not grosser than hairs.

The older branches are beset with solitary, sparse, rigid denticulations, of a larger size, and about a quarter or half an inch long, which in the dried plant appear like so many prickles.

Fructification.—The plant bears a great many solid tubercles, which appear to be the seat of the fructification. They are sessile, of a roundish figure, and placed in the forks of the older branches. They are of the size of the head of a large pin; of the same colour, and to appearance, much of the same substance with the branches.

OBSERVATION.

No figure or description of this plant can be observed in any of the botanical writers. It was found at sea, off the island of Jura, and taken up in the same manner, in sailing between the Lewes and the main land of Scotland. In both places, it was found in a mass, so twisted and interwoven, as not to be easily unraveled, and very much resembles the black fibrous roots of trees. In this resemblance, it exactly agrees with the Fucus radicibus arborum fibrosis similis. Ray. syn. p. 49. n. 45, but is a very different species from that plant.

The following plants were found growing the 27th of June, upon the top of the paps of Jura, in the most exposed situation, and at two thousand three hundred and forty feet of perpendicular height above the level of the sea.

Aira *flexuosa*, Linn.
Festuca *ovina*, Linn.
Vaccinium *myrtillus*, Linn.
——— *vitis idae*, Linn.
Statice *armeria*, Linn.
Orchis *maculata*, Linn.
Hypnum *filicinum*, Linn.
——— *squarrosum*, Linn.
Bryum *pulvinatum*, Linn.
Lycopodium *alpinum*, Linn.
——— *selago*, Linn.

The little herbage produced upon the very summits of those lofty mountains, is composed almost entirely of these plants.

FOSSILS.

Basanites (Juræ) subsemipellucidus cinereus, structura granulata; granulis quartze vitreis, fractura arenosa subpulverulenta inquinante.

Saxum quartzosum marmoreum cinereum. Linn. syst. nat. p. 191. n. 9?

NATURAL CHARACTER.

Situation.—The fixed rocks of this stone are continued in some places through a great extent of country, and of themselves, form some of the loftiest mountains. But it is sometimes also found in huge dispersed masses upon the surface of the earth.

It is disposed in vertical strata, full of fissures, whose fragments generally approach to a rectangular shape, and are to be found from two inches, to many feet in thickness.

Substance.—It is a simple, solid, crystallized stone, composed almost wholly of quartz.

Its colour is grey or greyish white, and in a thin plate is almost semipellucid.

It strikes fire with steel, but not so readily as the other quartzy stones. It scrapes easily to a white sandy powder with steel, and admits of a marble polish.

Structure.—It is of an indetermined unequal structure; generally granulated with grains of quartz, which are pellucid, unequal, and of a watery colour, and which are intermixed with particles of a white friable earth.

Its grain is rough, sandy, and nearly as gross as that of a fine sandstone.

The fracture is angulated, very rough to the touch, and so soft and powdery as to stain the fingers of a white colour, when rubbed upon it.

The stone is sometimes full of round empty pores, about the size of millet seed.

(The remainder in a subsequent volume.)

V.

A DESCRIPTION
OF THE
BASSE
AND ITS PRODUCTIONS.

I.

Figure.—This famous rock stands in the Frith of Forth, about three miles from the shore, directly opposite to the promontory upon which the ancient fortress of Tantallon is situated. It is nearly of a round shape, not above the sixth of a mile in diameter, and above three hundred feet high above the surface of the sea. Towards the south, that is, opposite to the land, it declines with shelving rocks to the water, where it affords the only landing place. Yet here it is accessible only in calm weather, and even then, not without danger, to those who are unaccustomed to make good their landing, by catching the rise of the boat upon the top of a wave.

Towards the west, north, and east, it rises perpendicularly out of the sea, near two hundred feet high;

and in some places, this lofty precipice projects at the top, which, to those who sail round it, forms a very frightful appearance. In other places, this huge rock is vaulted to a great depth by the waves; and a boat rowed into one of these caverns, presents to the eye a spectacle of uncommon horror. Upon the south side, where the island has a gradual descent, the sea is shallow; but on the west, north, and east, where it is perpendicular, there, close by the side of the rock, the sea is from two to three hundred feet deep.

The Isle of May, which is about ten miles off, presents to the west a perpendicular rock quite inaccessible; but towards the east, it is low and level. It extends in length, across the mouth of the Frith, from north to south, whereas, the islands inclosed in the Frith, Inch Keith, Inch Colmb, and Inch Garvie, observe the opposite course, and extend from east to west, that is, in the direction of the adjacent mountains on the coast of Fife.

II.

Harvey.—The famous Dr Harvey visited the Basse sometime about the beginning of the last century, and has left us an account of it, in his Book de Generatione Animalium. He introduces it in his combat against the idle notion of Aristotle and Pliny, who assert, that the shells of the eggs of birds are indurated after their exclusion: and though the argument he forms from his account of the Basse, is rather more strange than the strange opinion of these philosophers, yet his description of the place is so just, and the language in which it is conveyed so elegant, that it merits a rehearsal.

" Est Insula parva, Scoti Basse nominant, non " procul a littore in alto mari sita, abrupta et con" fragoso clivo editissima; verius Saxum ingens, " sive Scopulum dixeris; haud amplius mille pas" suum circuitu amplitudo ejus clauditur. Hujus " Insulae superficies, mensibus Majo et Junio, " nidis, ovis, pullisque propemodum tota instrata " est; adeo, ut vix uspiam, prae eorum copia, pe" dem libere ponere liceat: tantaque super-volitan" tium turba, ut, nubium instar, Solem coelum" que auferant; tantusque vociferantium clangor, " ut prope alloquentes vix audias. Si subjectum " mare, inde, tanquam ex edita turri, et altissimo " praecipitio despexeris; idem quoquoversum infi" nitis diversorum generum avibus natantibus, prae" daeque inhiantibus opertum videas. Tota Insula " adventantibus candido nitore micat, clivique tan" quam ex albissima creta, fulgent. Si circumna" vigando imminentem clivum suspicere libuerit, " videas in singulis praerupti loci crepidinibus, et " re-

"recessibus, avium cujuslibet generis et magni-"tudinis ordines innumerabiles; plures, quam il-"luni nocte, et sereno coelo stellae conspiciuntur; "si advolantes, avolantesque eminus adspexeris, "apum profecto ingens examen credas." P. 30.

III.

Rental and Produce.—Dr Harvey, in speaking of the produce of the Basse, expresses himself thus: "Haud facile dixerim, quantus reditus quotannis ex "plumis, et nidorum foco utilium, reliquiis, ovorum-"que coctorum commercio, possessori accedat: adeo, "quod mihi ipse narravit, fidem exsuperat." P. 30.

Mr Willoughby * observes, "that sea birds do "not build their nests of sticks or straws, but either "lay them on the naked rock, or spread under them "a little bent, or some such inconsiderable matter." He therefore thinks, that Dr Harvey was mistaken in what he here relates, of the profit arising from the reliques of the birds nests upon the island. This, though a very common, is a very unfair way of reasoning, to oppose a supposition to a fact; and in this instance it is without foundation. If Mr. Willoughby had ever been upon the Basse, he would, in some measure, have altered his opinion concerning the nests of sea-fowls. The nests of the solan geese, which cover a considerable part of the island, are of a great size, are built for the most part of sticks and branches of trees, some of them pretty large; and, as Dr. Harvey relates, the demolition of these nests still supplies the keepers of the Basse with a considerable quantity of fewel.

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* Ornithology, p. 18.

But, as I had the curiosity, as others likewise may have, of enquiring more particularly into the profits arising from this island, I shall here give an account of its rent and produce, according to my information from the persons who keep it.

RENT OF THE BASSE.

	£.	s.	d.
Rent to Sir Hugh Dalrymple, Baronet, the proprietor, 840 merks or	46	13	4
To the climber 100 merks, or	5	11	1⅓
To seven men employed in catching the fowls, 16l. Scots each, or	9	6	8
Carry over	61	11	1⅓

	£.	s.	d.
Brought over	61	11	1⅓
To the carrier thirty-six times to Edinburgh, 2s. sterling each time	3	12	
Other incidental expences ········			
Total ······	65	3	1⅓

PRODUCE OF THE BASSE.

	£.	s.	d.
They take the solan geese thirty-six times in the season, and at a medium, thirty-six every time; which, at 1s. 8d. sterling each, is	118	0	0
Sheep's grass ····················	5	0	0
Ten Scots gallons of oil, drawn from the fat of the fowls, at 8d. sterling each pint ···············	2	13	5
Ten stone-weight of feathers, at 10s. sterling per stone ············	5	0	0
Total	130	13	5

IV.

Spring.—Near the middle of the Basse there is a spring of fresh water; but it is observable in this, as in the spring upon Cramond Island and Inch Colmb, that it pours a very small quantity of water, and is situated considerably below the summit of the island.

PLANTS.

V.

FUCUS *Saccharinus.* Linn.

Upon the recess of the tide, we found growing on the rocks of the Basse, a very beautiful species of Fucus, which we never had formerly observed, and which never has been seen by any botanist, except by Mr Llhwyd in the Isle of Anglesea, where the inhabitants eat the small leaves and clusters of it, as they do the delesh, or dilse as we call it. It is delivered in Ray's Synopsis as a variety of the Fucus folio singulari, longissimo, lato, in medio rugoso, qui balteiformis dici potest. Raj. syn. p. 39. but is as different from that plant, as any one species can be from another. It may be distinguished as follows:

Fucus foliolosus, vel,

F. folio nervoso, foliolis ad stipitem anerviis.

DESCRIPTIO.

Stipes.—Coriaceus brevis teres, pennae anserinae crassitudine.

Folium.—Unicum longissimum coriaceo-membranaceum fuscum glaberrimum splendens, folio asplenii scolopendrium Linnaei simillimum.—Stipes continuatus abit in nervam mediam.—Margo folii undulatus, aliquantulum crispus, undis laciniisque obtusis.—Apex acuminatus.

Folioli.—Viginti circiter plantis vetustioribus infra folium stipite adhaerent, lineares, anervii, margine plano integro, versus apicem latiores, ipso apice obtuso.

Fructificatio—Mense Majo nulla obvia.

Mensura—Folium sex pedes longitudine, quatuor uncias latitudine equat.

Folioli semipedem longitudine, latitudine semiunciam.

Habitat rupibus submarinis prope imum aestus recessum.

Fucus phyllitidis folio. Llhwyd.—R. S. p. 40.

VI.

FUCUS *loreus?*

Upon the submarine rocks near to the high water mark, on the shore, below the castle of Tantallon, grows the Quercus marina 2. Ger.—Raj. syn. p. 43. n. 11. It is a species wanting in Linnæus, and which I never saw but in this place, and upon the rocks adjacent to the castle of Dunskey near Portpatrick. Its root is of a structure quite peculiar, and known in no other sea plant.

VII.

LICHEN.

On the rocks near the top of Northberwick Law, I found the following lichen which is not either in Ray or Linnæus.

Lichen *ruber*, v. L. crustaceus albus, scutellis rubris rugosis.

It belongs to Linnæus's second division of this genus.

In the same place grows the Lichen *geographicus* Linn. and the following species of Ray, which is wanting in the Species.

Lichenoides crustaceum et leprosum, scutellis nigricantibus majoribus et minoribus. R. S. p. 71. n. 43.

This plant and also the Lichen *calcareus* Linn. which grows in the same place, have both of them a white crust, the former, having black scutellae, and the latter black tubercles. When the dung or urine of sheep, birds or other animals, fall on either of these two lichens, their crust grows red or orange coloured, but the scutellae and tubercles continue black.

VIII.

PRIMULA.

Upon the shore near Northberwick, grows the Verbasculum *pratense odoratum.* Bauh. pin. 241. and also the Verbasculum *sylvestre majus singulari flore;* Bauh. pin. 241. I could never find out, upon what foundation Linnæus considers these two plants as varieties of his Primula *veris,* and by observing them in this place, I was still further persuaded, that they are different species. They grow here intermixed, without the smallest declension of the one into the other, each firmly retaining the characters by which it is strongly distinguished from the other.

IX.

LAVATERA.

I had long observed the English sea-tree-mallow which is one of the finest and rarest plants we have in Europe, remarked by Mr Ray to grow upon the Basse, and we accordingly found it in great plenty. It is of the genus of Lavatera, and if it is not the same, approaches very near to the Venetian sea-tree-mallow, or the Lavatera *arborea* Linn.—There is but an imperfect name of Parkinson's given of it in Ray's Synopsis, so that Grufberg in his Flora Anglica has left it dubious, whether the plant there intended, be the Lavatera *arborea* of Linnæus or not.—So far as I can find, there are but three botanists who ever saw both plants, Parkinson, Morison, and Sutherland. The two first have named and described them as distinct species, and they are also considered as such by Mr Sutherland, who had them both growing in the Edinburgh garden.—On the other hand, Linnæus's name of the Venetian mallow cannot be found in any article, to be specifically different from our plant on the Basse.

OBSERVATIONS.

The Lavatera and other malvaceous plants, are considered by Mr Ray[*] as monopetalous, but by Linnæus and the most part of botanists, they are commonly, though we think improperly, accounted pentepetalous. In this and several other malvaceous plants which we have examined, the five petala do not fall separately off, which we think they should do if the flower was pentepetalous; but the whole corolla falls off at once, strictly connected at the ungues, so as to form what ought to be accounted one petalum.

X.

CRAMBE.

We found a plant growing copiously upon the Basse, which, from its habit and the taste of its leaves, appeared evidently to belong to the Tetradynamia; but, having neither flower nor fruit upon it, we could not positively determine either its genus or species. I imagine it belongs either to the Crambe or

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[*] Method. emendat. 1703. p. 86.

or the Bunias, but is different from all the species of Linnaeus under these genera. It appears to be the Kakile, sive Eruca marina latifolia. Chabr. Sciagr. p. 77. It is also figured and described by John Bauhinus, but I find it recorded in no other writer.

The leaves being large, tender and succulent, we caused dress a dish of them, and agreed in thinking them preferable to any other greens we had ever tasted. Our worthy friend Dr. Wright, not long before his death, sent for a large quantity of this plant, which he cultivated in his garden at Carsie; but how it succeded upon being transplanted, I have not been informed.

From the sea-side we have acquired some of the best esculent plants in our gardens, and from the same source, we have still reason to hope for more. Besides others, the

Crambe *maritima* Linn. or Sea-Colewort.
Asparagus *officinalis* Linn. or Sparrowgrass.
Beta *vulgaris* Linn. or Beet.
Brassica *oleracea* Linn. or Colewort, with the numerous varieties of cabbages, collyflowers, and brocolis, are all natives of the sea-shores of Britain; and the
Cynara *scolymus* Linn. or Artichoke, of the shores of the Mediterranean?

To

The tender and succulent substance, so general in the roots, stems, and foliage of maritime plants, and the success, which has attended the few that have been tried, gives ground to think, that there are many others, which might with advantage be introduced into our gardens.

To countenance such a trial, I must farther observe.

That the great number of plants, which in different parts of the world are confined to the shores of the ocean, appear in general, to be of a salubrious nature; and amongst them all, I can find but one plant of a suspected quality, which is the Chelidonium *glaucium*, Linn. or yellow horned poppy.

In proof of this conjecture, I have had time to examine particularly but one class; the Umbelliferæ, which I pitched upon, because it is known to contain a greater number of deleterious and poisonous individuals, than any other. Of this class, there are a considerable number of plants, which are either entirely peculiar, or which shew a particular affection to the maritime station; but of these, physicians and botanists have discovered the qualities and virtues of the seven following species only.

Peucedanum *officinale*, Linn. Sulphur-wort.
Anethum *fœniculum*, Linn. Fennel.

Smyrnium *olusatrum*, Linn. Alexanders.
Eryngium *maritimum*, Linn. Sea Holly.
Apium *graveolens*, Linn. Celleri.
Crithmum *maritimum*, Linn. Samphire.
Ligusticum *scoticum*, Linn. Scots Sea Parsley.

The Peucedanum has long been known, and as we are told by many, has long been successfully used as a medicine. The Anethum, Smyrnium, Eryngium, Apium and Crithmum, are daily used as articles of diet; and concerning the Ligusticum, which is a plant almost confined to the sea shores of Scotland, we are informed in Ray's Synopsis, page 214, that our Highlanders eat it before any other thing in the morning, to preserve them, as they think, from infection all the rest of the day; and indeed, its strong and grateful aromatic taste, would plead, that in this practice they judge not amiss; to which, and to many better medicines, they and other rude nations have been oftener directed, may I say by instinct? than by accident, example, experience or reasoning.

The umbelliferous class then, so far as it goes, justifies our notion of the salubrity of maritime plants.

It is not easy to find any unexceptionable rule, to distinguish the noxious Umbelliferæ, from those that are innocent. If we search for it, where we have most reason to expect it, in the natural genera, we find ourselves disappointed. It has been observed, that such of them as grow in watery places, are of the former kind, and those which inhabit dry grounds of the latter. To this rule, however, though pretty general, there are several strong exceptions, such as must make it appear dangerous to trust to it. The

Conium *maculatum*, Linn. or Common Hemlock, and the
Æthusa, Linn. or Fool's Parsley, which are far from being innocent, grow in very dry fields, while the
Apium *petroselinum*, Linn. or Garden Parsley, the
Carum, Linn. or Caraway, and the
Angelica *archangelica*, Linn. or Garden Angelica, though innocent and carminative, like the bulk of those which inhabit a dry soil, grow naturally in as watery a situation as the
Cicuta *virosa*, Linn.
Oenanthe *crocata*, Linn. the two most poisonous plants of the whole class.

Though I would not propose it as a rule to be depended on, in so dangerous a case, as that of poisons, yet I think it highly probable, that all the maritime plants of the umbelliferous class are salutary and esculent. This I am certain of, that none of the umbelliferous plants, known to be poisonous are stationed upon the sea shore: All the maritime plants of this class, whose qualities are known, are known to be innocent; and it is further remarkable, that this is not to be ascribed to their dry situation among the maritime rocks, or upon the sandy beach; for the celleri and sulphurwort, grow in the salt marshes, in as watery a soil, as any of the umbelliferous aquatics that are poisonous; but here, I imagine, lies an essential difference, between plants that inhabit salt water and fresh. The latter are, in general, either acrid or narcotick, which is never the case with the former, as might be proved from a variety of examples.

XI.

CORALLINES.

All the Corals without exception, and almost all the Corallines, grow at the bottom where the sea is of a great depth, or at least in such places as are never left uncovered upon the recess of the tide. The tender animalcula which inhabit them are known to perish soon after they are taken out of the water. This, no doubt, is the reason why their situation is different from that of the sea plants; which, for the most part, are so placed that, by the flux and reflux of the tide, they alternately experience the vicissitudes of air and water, four times each twenty-four hours.

The Corals and Corallines being thus remotely stationed in the recesses of the deep, and withdrawn far from the eyes of the inquisitive; their nature and the progress of their growth was, till the year 1723, involved in total obscurity, being by these means scarce ever seen in their recent state, but by fishers and seamen. The philosophers, who have of late made these bodies the subject of their enquiry, have found the greatest inconvenience in acquiring them; being themselves obliged to go off to sea, to raise them from the bottom with dredges. I have often in vain searched for them, upon the most distant sea-rocks; for, except the officinal Coralline, I never found any of them growing without the low-water mark.

In sailing, however, round the Bass, at a very low ebb, I found above the surface of the water, three or four species of Corallines growing in great plenty upon the fuci which adhere to the perpendicular walls of that rock. Some of them were above three hours out of the water; which shews, that they do not perish near so soon, when exposed to the air, as has generally been thought. I could not make any advantage of this opportunity, having no apparatus either to inspect or preserve them. To those, however, who wish for such an opportunity, this may serve as a direction to the most favourable place that can be desired, for making observations upon these extraordinary productions.

ANIMALS.

XII.

ALCA.

* Mr. Ray, who was upon the Basse in August 1671, observed in it six species of sea-fowls. All that we could discover upon it in the month of May, just amounted to the same number; but with this difference: that two of the species, which he mentions, did not occur to us; and two of those, which we saw, were not observed by him.

He remarks, that there was a bird upon this island called the scout, but appears to have got but an imperfect

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* Willoughby's Ornithology, p. 19.

perfect view of it, as he supposes it to be either the Lomvia or the Alka Hoieri. We shot half-a-dozen of this species, and upon examination found it to be the former, that is, the

Alca *lomvia* Linn.—As I have had the opportunity of seeing all the six species of which Linnaeus's genus of Alca is composed, I cannot help thinking that there are three of them so widely different from the other three, and the individuals of each division so naturally allied among themselves, that they ought to compose two different genera.—This is so much the case, that it will be difficult, if not impossible, to find a proper generical character, that will apply to all the six birds enumerated by Linnaeus. This difficulty he has encountered, and very unsuccessfully; for his generical character of the Alca does actually belong only to three of his species.

As Linnaeus has given us no account of the species of Alca now mentioned, though imperfect, we add the following

DESCRIPTION.

Rostrum—edentulum acuminatum nigrum, longitudine 1½ unciae.

Mandibula—superior leviter arcuata, inferior recta, ad basin gibba.

Lingua—integra, sagittata.—Palatum denticulatum.

Iris—oculorum cinerea.—Aures lineares.

Pectus.—Abdomen alba.—Caput et Collum castanei coloris.

Dorsum—fusco-nigrum.—Cauda superne nigra, inferne alba.

Alae—parvae, superne nigrae, inferne albae.—Remiges duodecim primores nigrae: Secundariae nigrae apicibus albis.

Femora—seminuda.—Pedes nigri tridactyli palmati. —Ungues nigri.

This is the fowl which in the Frith of Forth is called the Marrot.

XIII.

We likewise found building upon the Basse the

Pelicanus *carbo* Linn.

Larus *canus*, Linn.
Alca *torda*, Linn[*].
Larus *fuscus*, Linn.

The two last of which were not seen in this place by Mr. Ray.

I enquired particularly after the Turtur *marinus bassanus*, Willoughby Ornithol. p. 27. or the sea Turtle dove of the Basse, mentioned by Mr. Ray[†]. Though he did not see it himself, he speaks of it as peculiar to this island; and yet the keepers of it informed us, that they knew no bird of that name that frequented the place. This, and the Cattiwiak, were the only two birds mentioned by Mr. Ray[‡], which we did not find upon it.

Besides these five species we have enumerated, we saw but one other bird upon this island, but for which indeed it is very remarkable, that is,

U XIV.

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[*] The Alca *torda* Linn. is likewise called a Marrot by the fishers in the Forth.

[†] Willoughby's Ornithol. p. 19.

[‡] As inhabitants of the Basse.

XIV.

Pelecanus *bassanus* Linn. or Solan Goose.—It may fly indeed, at times, to other sea coasts; but I do not find that it breeds any where else, at least not in Europe. Mr. Willoughby knew of no other place in Britain where they hatched, besides the Basse: but I am informed that they build in several of the Orkneys; and it is certain that they are very frequent in some of the most northerly of the Western Isles. They bring forth their young also upon the Isle of Ailsa in the Frith of Clyde, but in no place further south that I can learn.

They come to the Basse in the month of March, and after they have bred, go away in September. Yet generally there are some few that stay about the island the whole winter, which are judged to be the the old ones, that are not able for the distant flight undertaken by the others.

They neither come nor go away all at one time. Before their arrival a few of their number come to the Basse, which are supposed to be dispatched as scouts; and, in some days thereafter, the main body arrives in several successive divisions.

It is commonly reported of this bird, that it cannot fly out of sight of the sea. And the report may be thus accounted for: The keeper of the Basse informed us, that it is scarcely practicable for them to raise themselves off plain ground; which it is easy to imagine must be the case, because of the shortness and particular position of their legs, and the very extraordinary length of their wings. They, therefore, industriously avoid the land: but when they happen to rest on it, which is never the case but when they are forced by a storm, their visible inability in taking wing has been ascribed by the vulgar to their being out of sight of their native element.

The egg of the Solan goose is all white, of a rough surface, of a long shape, and remarkably small for the size of the bird, being scarce larger than that of a duck. The male and female hatch and go a fishing by turns. They bring to the nest four or five herrings, or a great number of garvies (sprats), in their gorget; and these the young fowl pulls out with his bill, as with a pincer.

They lay and hatch only one egg in the season; which, it is currently related, they hatch with their foot, and place it upon one end in such a manner, that, if a person overturn it, it will be impossible for him to make it stand as before. This Dr Harvey takes notice of in his description of the Basse above-mentioned.— "Inter avium tam diversa genera," says he, "quae

" ad insulam dictam generandi causa advolant, tam-
" que varios nidorum modos, in quibus ova incubant;
" una mihi monstratur avis, quae ovum duntaxat sin-
" gulare, sive unicum parit, idemque super cujusdam
" lapidis acuti fastigium collocat, nullo nido, aut
" conquisita strue supposita, idque tam firmiter, ut
" mater abire et redire salvo ovo possit. Hoc au-
" tem si quis dimoveat, nulla arte postea stabiliri
" potest; quin inde devolutum, praeceps in mare
" ruat." p. 31.—Our enquiry into these particulars shewed them to be fabulous. The keeper informed us, that they do not stand upon their egg, as is commonly reported, but sit upon it with their breast, which we saw indeed, like other fowls, but one of their feet is always folded under them upon the egg. Neither is it poised upon its end, but lies upon its side, and they turn it like other fowls.

The first year, the Solan Geese are of a dark colour, between brown and grey, but grow whiter and whiter every year, till they turn entirely so, except the tips of their wings which are black. None are observed by the climber to hatch, but such as are quite white; from which he supposes, that they are five or six years old before they breed.

The attachment of animals to particular places, and their various migrations, is a fruitful source of many curious observations. Why the solan goose is an inhabitant of no other part of Europe except the northerly coasts of Britain: Why it fixes its habitation in so particular a manner upon a few islands, while it avoids all others, though to us they might seem as commodious: Why it builds in no island upon the east coast of Britain, except the Basse: Nor in any upon the west, from the Lizard, to the most northerly of the western isles, except Ailsa; and why it migrates annually from north to south and returns: These are well known and interesting phænomena in the history of this animal, which certainly deserve enquiry, and which may be accounted for as follows.

This bird is known to be supported chiefly, if not entirely, upon two species of fishes, the herring and the garvie; the Clupea *harengus* and the Clupea *sprattus*, Linn. Being unadapted by its structure for alighting and feeding upon the shores, it subsists by the catching of fish at sea. A gregarious fowl of so large a size, could not in this way be maintained in our seas, but upon those fishes, that swim in shoals, and in great numbers. Such are the two species I have now mentioned, which are also exactly calculated for food to this bird, in respect of their size, and their swimming so near the surface, as to be easily taken up upon diving. The herring and the garvie then, being the proper, if not sole subsistence of this bird, and as these fishes are known to be peculiar to the British seas, and especially to those of North

Britain, the reason is from thence evident, why the solan goose becomes an inhabitant of Scotland, and of no other part of Europe.

The attachment of this bird to a few islands in Scotland, appears to be owing to their peculiar shape and structure. All islands of a flat shape, or whose surface and rocks only decline to the sea, would be incommodious for its habitation, because of the extreme difficulty it labours under, of raising itself off the land. It therefore builds only upon those islands, whose sides are steep, from whence it can take its flight, not by rising, but by throwing itself down. Such, precisely, is the structure of the Basse, exposing every where to the sea a perpendicular rock, except on one side, where it declines, and there, and upon the surface of the island, no nests of the solan geese are to be seen, being all placed upon the shelves and at the top of the perpendicular sides of the island, from whence, the birds easily fling themselves into the air. It is plain, therefore, why the solan goose is peculiar to the Basse, upon the side of Britain, because there is no other island in the whole extent of its east coast of such a structure. Such, likewise, is the structure of Ailsa, and as I am informed, of all the

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* Mr Jackson observed here, that the true pelican or *pelecanus onocrotalus*. Linn. builds upon the small rugged isle of Rodonda between Montserat and Nevis, in the same manner as

the northern and western isles, where this bird fixes its habitation*.

The solan goose migrates, in consequence of the migrations of the two species of fishes, upon which it subsists, and observes principally, the motions of the herrings. For about two months after it comes to the Basse, its chief subsistence is garvies, but in July, when it has hatched its young, the herrings usually appear in the mouth of the Frith, where, they for the most part continue, till about the end of August. The herrings move southwards about the time that the young geese are ready to fly, and then the whole colony follows the shoal to Yarmouth, where they serve as a sure index to the fishers. In like manner, and about the same time, the solan geese upon Ailsa, follow the herrings which go down St George's channel, and attend them sometimes as far as the Severn. Late in Autumn, the shoals upon both sides of the island return northwards, and are attended by the solan geese to the north isles, where, so far as I can learn, the whole species resides during winter.

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as the solan geese do upon the Basse, which it exactly resembles in its structure. That the pelican is precisely of the same shape and form with the solan goose. That it is, like it, unable to take its flight off land, and that it builds no where in the West Indies, but upon this, and other unfrequented islands, where the rocks are quite perpendicular.

VI.

THE HISTORY OF SHELL MARLE.

SHELL MARLE is a mineral, little known to naturalists, and hitherto but superficially described. It is of a singular kind, and exhibits some very uncommon appearances, with respect to its nature and origin. Its present extensive use in agriculture, as a manure, renders the knowledge of it necessary and valuable. For these reasons, it is hoped, that an enquiry into its Natural History, will not be unacceptable to the inquisitive.

Shell Marle, is a mineral earth, of different colours; soft and friable, acquiring no hardness with any degree of fire; lighter than all other fossils; alkaline, and easily convertible into quick-lime; always lodged in the earth in horizontal strata, and frequently filled with the shells of fresh water testaceous animals.

Some imagine, that marle is naturally but of one colour, which is white, and that all its other colours, arise from adventitious mixtures; this, indeed, is the case in several sorts; but there are others, in which the nicest observer cannot discover any foreign matter, from which they could derive their colours. These colours, do therefore, originally belong to such marles, and are to be accounted as natural as the white.

The texture of pure marles, is generally much the same. They are always friable, though some indeed, are more brittle than others. Marle has usually been called a fat earth, but with great impropriety. By moisture, it may become slimy to the taste and touch, and by a vulgar mistake, is therefore reckoned unctuous. Some sulphur it does indeed contain, but that renders it not sensibly unctuous. In this, it resembles a white argillaceous earth, found in Italy, from which a factitious sulphur is procured by distillation.

Some marle is so extremely light as to swim, when first put into water. This is always the case, when it is pure. Some impure kinds, are considerably heavier, but their precise specific gravity, we have not yet determined. The lightest, however, is always found to be the strongest manure.

The alkaline property of marle, whereby it effervesces with acids, is its grand characteristic. Of this property every species of shell marle is possessed, and no fossile destitute of it, ought to be denominated by that name. In consequence of this property, it is a calcarious earth, and convertible into a quick lime, by a smaller degree of fire, than any other body yet known.

No kind of shell marle has ever yet been found but in mosses or boggy ground, and the superficial soil where it lies is always moss. It is sometimes indeed found in bogs, lying next the surface, sometimes but with half a foot, at other times with sixteen or eighteen feet of moss above it. But in every case its stratum is always horizontal, or but a little inclined to the horizon, and distinctly separated from the superjacent moss.

Marle is generally more or less full of small shells, but is sometimes found, without the least vestige of such shells. From these, it receives its name of shell marle. Though the shells retain their figure, they are so rotten and brittle, that they scarce can bear the touch; they are evidently the exuviae of certain small snails, inhabitants of the fresh water, to be found alive in lochs, bogs, mosses, and the like places, where fresh water stagnates. Of these there are two species, which are more frequent in marle, than any other, and both are figured and described by Dr Lister in his Historia Animalium Angliae. The one he calls, Buccinum exiguum, trium spirarum a sinistra in dextram convolutarum. Which is a small turbinated shell, of a very thin and tender substance, seldom above half an inch in length. The other, which is bivalvous, and smaller than the former, he terms Musculus exiguus, pisi magnitudine, rotundus, subflavus, ipsis valvarum oris albidis. There is a third species found in marle, but less frequent than either of these, it is a small nautilus, and described by the same author.

As shell marle is incapable of induration, either by heat or moisture, it resists petrifaction, and is never found in a lapideous, but always in an earthy form. By this, it is sufficiently distinguished from stone and slate marle.

From clay marles, it is also distinguished, by its great lightness and friability. These always possess a much greater degree of weight and tenacity; and though some of them resemble it, in its alkaline property, yet they all harden with fire, which sufficiently shows its difference from that genus of fossils.

From sandy and loamy marles, it is clearly distinguished by its alkaline quality, of which they are never possessed.

But there is no fossile, for which marle is so frequently mistaken as clay. It is therefore necessary to make the distinction betwixt them, as clear as possible. For this purpose, their weight is sometimes used as a standard; but in this case we may be deceived; for some kinds of clay are as light as marle. Clay is usually more coherent than marle, and more ductile when moist; yet neither by these qualities, are they always clearly distinguishable.

It is often delivered as a signal property of marle to dissolve in water, but with great inaccuracy. No earth can be properly said to dissolve in water; at least, this can only happen in a remote way, that is, by the intervention of some other solvend. When marle, or any other earth, therefore, crumbles to dust in water, it may be said to fall, but not to dissolve.

To say that marle universally falls in water, is to form a general rule, from a particular instance; for though it holds in some kinds, it is false in shell marle.

EXPERIMENTS.

A piece of dry white marle, being put into a glass of water, though it stood for eight days, it did not in the least crumble, but continued in the same entire piece during the whole time; neither did it shew any signs of viscidity, but remained friable; whereas pieces of dry clay, fell immediately into a slimy powder, and the most tenacious sorts grew viscid.

Corollary. To fall in water, is therefore no universal property of marle, nor is it to be used as a criterion to discover it. Clay, when dry, is always hard; when wet, viscid; but in both states marle is always friable.

Clay indurates with fire, and even sometimes acquires a stony hardness; but marle acquires no hardness with any degree of fire. Marle always effervesces with vinegar, but clay never, and turns easily by fire, into a calx vive, which happens in no kind of clay.

The other properties of these fossils, though changeable, may be of use to distinguish them; but these three, are invariable, and make a more certain distinction.

Of shell marle, we have observed the following kinds; white marle with shells, white marle without shells, grey marle, cow-shot marle, shelvy marle, peat marle, and clay shell marle.

Concerning the origin of marle there are two different opinions. The first is, that it consists wholly of the substance of shells, reduced to earth by putrefaction; the other, that it is a native mineral earth.

We shall give no preference to either of these opinions, but state the arguments impartially on both sides and leave others to judge. The arguments in favour of the first opinion are as follow.

Upon trial of a great variety of the shells of the Cochleae Fluviatiles, or fresh water snails, when inhabited by the animals, and particularly those kinds that abound most in marle; they were all found to be alkaline with vinegar.

Corollary. It would appear, therefore, that these shells reduced by putrefaction, would form an alkaline earth, such as marle.

OBSERVATIONS.

Marle is found only in mosses and boggy places, where formerly there may have been a stagnation of water, the natural habitation of these testaceous animals.

In all mosses, the stratum of marle is deepest in the middle, and grows gradually thinner towards the sides.

This observation tends to prove marle to have originated from the shells of snails, which in a pool of water, would be spread thickest in the middle, where the water was deepest.

There is sometimes a stratum of moss, included in a stratum of marle. Particularly, in one place, where the marle reached the surface, it was a foot and an half deep, beneath which there were fourteen inches of pure moss, and under that another stratum of marle.

Of this appearance we cannot as yet presume to give a satisfactory account. As it is here delivered, we can aver it to be a certain fact; and on this subject it seems to be the Observatio Crucis.

It may lead us to think that the stratum of marle could be formed above the moss in no other way than by means of shells.

On this supposition, we might expect to reap a growth of marle from a plantation of these animals.

We may now state the arguments on the other side.

EXPERIMENT.

When marle is long calcined, it grows black, but the shells that are in it, though likewise calcined, continue white.

Cor. This shows, that the marle, and the substance of these shells, are of a very different nature.

OBSERVATIONS.

Limestone, marble, chalk, and some earthy minerals, are all alkaline, and frequently filled with shells; yet none ever imagined that they had any such origin as that above ascribed to marle.

Beneath four feet of moss, we knew once a bed of grey marle, three feet thick, and full of shells. Under this, there was a stratum of clay and stones, a foot thick, and beneath that, two feet more of pure white marle, which had no shells.

It is a frequent case to fall in with a band of clay, in the midst of a bed of marle. The marle above the clay is full of shells, but none are to be found in the clay, or in the marle under it, so far as I have observed.

This is a presumption, that the marle under the clay, has another origin than shells, and is a native and sui generis fossile.

Some think, that where these shells abound in stagnating waters, they are a sure sign of marle; but this is quite a mistake. These shells, are to be found in abundance, in the stagnating waters of almost every part of Scotland, and in many places, where, upon repeated trials, no marle could be found.

VII.

PUBLIC LECTURE

ANNO 1788.

ON THE

UTILITY AND PROGRESS OF NATURAL HISTORY, AND MANNER OF PHILOSOPHISING.

1. By the word Nature, if we mean any thing at all, must be understood, " that system of laws, established by the Creator, for the preservation and government of the material world." By these, the whole frame of nature is directed. The bodies which compose that frame, and the laws by which they are regulated, form the proper subject of Natural History.

2. There is indeed an important class of bodies in nature, whose constitution and internal properties,

belong rather to general physics and chymistry, than to natural history. These are air, light, heat, phlogiston, and the electric and magnetic fluids; but the effects of these powerful agents, are often the province of the naturalist, where they become conspicuous in other natural bodies.

3. There are also certain cosmical qualities, which are to be viewed in the same light; such as the declination and inclination of the magnetic needle; the daily variation of both, and the greater extent of that variation, in summer than in winter; the different power of gravity in different latitudes; the attraction of the waters, and other influences of the moon; the peculiar altitude of the barometer, and of the tides, at the distance of a quadrant both from the line and the pole. These are general qualities of the globe, which go deep in this sublunary system, and whose causes are utterly unknown; but so far as their effects are discernible, in the bodies of nature, they become the subjects of natural history.

4. Among the most ancient philosophers, Thales considered water, and Anaximenes air, as the original principle of all things. Aristotle either discovered, or brought into repute, the four elements of air, fire, water, and earth. The elements of Paracelsus, were evidently the discovery of the alembic; water, spirit, salt, sulphur, and earth. These principles still continue to be adopted by philosophers as

the elements of natural bodies, but without assuming them as absolutely simple; on the contrary, we now know, that some of them are compounded and have reason to suspect the composition of others.

5. The philosophy of the elements has been more nicely scrutinised, and has afforded more discoveries, since the first publication of Dr Black's experiments, than in all preceeding ages. Our ideas concerning them, have of course, even in that short period, been totally altered. What were formerly viewed as the most simple bodies, and even as elements, are now considered as substances of a compound nature.—Phlogiston, as a combination of air, and fixed fire: all acids, as a combination of fire and fixed air: even water itself, has been generated, by the combustion of a mixture of inflammable and dephlogisticated airs. These, and other discoveries of the like nature, which might be mentioned, when once discovered, must throw great light upon the principles of natural bodies and their history.

6. All the powers of man have been employed, from the most remote antiquity, in bringing the various branches of human knowledge to their present perfection: but natural history may be numbered as one of the most modern of all the sciences. There was little done upon this subject by the ancients; and except some rude botany, and some vague discussions in zoology and other branches, scarce any

thing by the moderns, till the institution of the Royal Society anno 1665, which may, more than any other æra, be accounted the date of its commencement as a science.

It has at all times been chiefly prosecuted by physicians. The very word physician indeed, properly means a naturalist; and this meaning is still applied to the word in foreign countries. The connection between the subjects of Natural History and the several branches of medicine, is strong. It cannot be said that natural history is indispensably necessary to every person who practises physic, (many useful practitioners have been totally unaquainted with it), but I may venture to say, that it is necessary to form an ornamented physician: and that, at all times, the greatest physicians have been the most remarkable for their knowledge in this science.

A disposition to enquire into the works of nature, is generally accompanied, likewise, with a philosophic turn of mind:—Hence, an attachment to natural history, has always appeared in the men who, in every age, have been the most eminent in philosophy. Among the Greeks, Aristotle, Theophrastus, and Hippocrates:—Among the Romans, Cæsar, Seneca, Dioscorides, Pliny, and Galen:—Upon the restoration of letters in the 16th century, Cardan, Fallopius, and Gesner: In the 17th, Gassendi, Bacon, and Boyle: in the 18th, Leibnitz;

Boerhaave, Haller, Linnaeus, and Bergman. And of those yet alive, who are remarkable for their philosophic genius, and their proficiency in natural history; a more numerous list may be given than at any other period.

7. It is only by the arrangements of natural history, that the almost numberless bodies which belong to this globe, can be known and ascertained. Was it not for the labours of the scientific naturalists, the three kingdoms of nature would be to mankind, but a scene of confusion—an inextricable mass of individuals, without order or distinction—a mere chaos of nameless and undefined beings. From this disagreeable situation, we are delivered by the powers of systematic arrangement. Whatever Animals, Plants, or Fossils are presented to our view, though unknown before, we can now discover with certainty; we can tell their names and character, their qualities and uses, and whole history, so far as it is known. Like the solution of a problem, this sort of discovery is not only agreeable to an inquisitive mind, but is often productive of the greatest utility, both in the sciences and in the arts of life.

8. Many plants have first been made known to us by their uses; such as the Quinquina, Rhubarb, Ipecacuhana, Scammony, Sarsaparilla and others. It is only twenty-four years since the botanical character of the Rheum *palmatum*, Linn. was discovered.

ed. Before that period, several spurious plants were imposed on the world as the true Rhubarb. But being now in possession of the botanical character of those other articles of the Materia Medica, we are in no danger of any such imposition with respect to them.

Other bodies, after being discovered and long known, have been found possessed of valuable properties: such as the Papaver *somniferum*, Linn. the Loadstone, Mercury, Antimony and others.* A scientific knowledge of the bodies, is a most useful preliminary to the discovery of their virtues and effects. The virtues of plants, particularly, are in part discoverable by analogy. If two plants are of the same genus, and stamped with the same natural character, it affords a strong presumption of similar qualities. The Jamaica Bark was lately discovered in this way.

When the productions of a country have been scientifically examined, when their species are investigated, and the natural order known to which they belong, opportunities must then occur to the naturalist, of discovering in them many useful properties; and that, not by accident, which is usually the case, but upon principles. By the same means also, the uses discovered in the productions of one country, can with ease and certainty be communicated to every other country, where they happen to be produced.

It is only by an exact natural history, that we can have a complete idea of any country we have not seen. Voyages and travels are instructive and entertaining, chiefly as natural histories; but few of those books have ever been written by persons qualified for the task. In Linnaeus's Flora Lapponica, and Gmelin's Flora Sibirica, the world for the first time received a satisfactory account of Lapland and Siberia. The Travels of Hasselquist in Ægypt, of Kalm in America, of Osbeck in China, and, of Sparmann in Africa, convey more substantial information concerning those countries, than we have any where else obtained. The first philosophical travels were those of Mr Ray, about a hundred years ago; and since that time, by the progress of the science, we have, in the works of Naturalists, who have travelled, such treasures of knowledge concerning the different regions of the globe, as the world was never favoured with before.

9. The numerous and different methods of arrangement in natural history is a subject of frequent complaints; but they are not founded upon mature consideration. Different arrangements are not only useful, but necessary; and they have been the means of advancing the science to its present state.

Different methods in botany were very numerous, before Linnaeus appeared; but without their aid, he could never have executed his system.—Even the Linnaean system, with all its advantages, is not to be considered as the *ne plus ultra* of botany.—The very principle on which it is founded, though highly plausible, is one of its most defective parts.—The classification founded on that principle is extremely exceptionable: and there are several of the classes, particularly, the Syngenesia, Monoecia, Dioecia, and Polygamia, that stand much in need of a new and different arrangement.—The great excellency of the Linnaean System consists in two points: the establishment of the Genera; and the definition of the Species.—It is only by means of these, that the Sexual system has made such progress in the world.

I may take notice of one other advantage that has arisen from it. The names of the Linnaean System are now become the general language; a sort of universal character in botany: and the system itself is universally received and useful. Whatever may be its defects, they can only be remedied by a very skilful and superior hand; nor are any alterations in it to be wished for upon slight grounds.

A very material alteration in it is at present projected by his successor Thunberg, a person highly qualified for the task: yet it is doubtful, if what he intends will meet the wishes of the botanical world.

He proposes the abolition of the four classes, Gynandria, Monoecia, Dioecia, and Polygamia; and the insertion of these classes, as likewise of the Palmae, into the other classes, according to the number of their stamina and pistilli.

This proposed improvement tends to render the Sexual system still more artificial than it is, and to deprive it of several natural classes and orders, which form not only one of its greatest ornaments, but which must always afford great light, and be essentially useful to a botanist.—Was the genus of Salix, for example, to be transferred, as he proposes, to the Diandrious class: for the same reason, the Pentandrious, Triandrious, and Monandrious Salices, must be referred to other classes; and thus the most natural genera would necessarily be torn asunder.—Was he, or any such able botanist, to supply us with a system, strictly and entirely, either natural or artificial, he would render indeed a most essential service to the science.—But Linnaeus's method is that mixed system, participating of both, and more useful than either; in which, the obvious rules of art are generally observed, but are made to give way, wherever a clear and natural arrangement comes in competition.

The twenty-five classes at present in the Sexual system, would thus be reduced to twenty, by Dr Thunberg. But surely, the vast numbers of plants lately discovered, and the very great additions still to be expected, render it more expedient to augment, if possible, than to diminish the number of classes.

The Palmae, particularly, form one of the seven most general families of plants; they are strongly marked by nature, as a separate race; but because they have a fixed number of stamina, to involve them in overgrown classes of plants, with which they have no other connection, is contrary to all the ideas I have been able to form of a natural arrangement. It may serve to perplex, but can never be useful.

Professor Murray at Goettingen, has lately given us an excellent edition of Linnaeus's *Systema Vegetabilium.* Was he in like manner to publish the Linnaean Species, with all his own observations, and the later discoveries of others, he would give us the most valuable work in botany that we can at present have in view.

In the animal kingdom, Linnaeus's method approaches nearer to the methods of his predecessors, than in the vegetable.—He introduced, however, many important improvements; and left his system of animals, a very compleat and wonderful work for a single man to accomplish.—Many considerable alterations have since been proposed; and there is still certainly great room for new arrangements in

Zoology, especially in the classes of Insecta and Vermes.

But there is no part of natural history, that is now so destitute of regular system as Mineralogy: this branch having been neglected, while the others have been greatly improved. And it is likely, that many new methods must appear, before the science arrive at that perfection which botany and zoology have attained.

10. From ignorance and false ideas, natural history was for a long time viewed, as the object of sarcasm and wit; from the days of Erasmus downwards to Mr Pope.—It has now, in a great measure, got the better of this; but it has had, and has even at present, other obstacles to contend with.—These, however, having no better foundation than the former, must like it give way, as light and knowledge spread among mankind.

It is become fashionable, especially with the French, to decry the elementary parts of natural history; as if it were possible for a person to become a master in that, or any other science, without studying or understanding its elements.

Like other sciences, natural history has its rudiments; certain fixed principles and rules, to serve as a foundation of the structure.—Its objects are extremely numerous.—The particulars to be observed in the history of the atmosphere, of the waters, and of the earth; and the species which exist in the mineral, vegetable, and animal kingdoms; form the whole frame of nature.—But is this frame to be understood, while we are ignorant of the parts of which it is composed?—No: on the contrary, if we would attain a general and useful knowledge in this study, it must be founded in a knowledge of particulars.

It is frequent, even with some who pretend to be naturalists, to vilify the fundamental parts of natural history—who view the particular species and bodies in nature; their systematic arrangement; their correct denomination; and the description of their parts and properties; as a study too minute, frivolous, and beneath their notice;—Whose large views are only directed to what they call the volume of nature, and the great lines in natural history.—But I know of no great lines in natural history that are not composed of small ones: nor have I ever had occasion to admire any man's knowledge concerning a great line, that was ignorant of its component parts.

As for their volume of nature—like other volumes, it consists of pages; and those pages, of lines, words, and letters.—But without an acquaintance with these, we have no more right to pretend to understand this boasted volume, than we would

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have to understand a book, whose letters, words, lines, and pages, we have never perused.

It is true indeed, that, though ignorant of these, a man may contrive to give a general account of the size and form of the volume, and the manner of its binding.—And with regard to many of the recent writers on Natural History, I am sorry to say, this is all the knowledge they discover in the volume of nature.

Opportunity, time, inclination, and genius, are all of them in some degree required to make a progress in any science. For want of one or other of these, many, who of late have set themselves forward, as writers in natural history, are evidently ignorant of the very rudiments of the study in which they write; and it is remarkable, though not more indeed than what is to be expected, that it is only among such writers, that we find the elements of natural history decried. So apt are mankind to depreciate the knowledge they do not, and still more, the knowledge they ought to possess!

11. Notwithstanding the advancement of natural history, its progress has been by no means so great, as might have been expected, from the numerous writers on the subject. But it must be noticed, that the labours of many, even of the most voluminous, have turned out but to little account. Such are the

speculatists, who descant on the general topics of the study, and the discoveries of others, without contributing even a mite to the stock of real knowledge, who retail what has been twenty times retailed before, the trite and superficial parts of the science, and that often in unmeaning rant, the mere verbage of natural history.

But though it may be regretted, that so much labour should be in a manner lost; yet in such speculations, there may still be one degree of use, in amusing for a moment superficial readers, and in disseminating some ideas of natural history, among the less informed part of the world.

12. The progress of natural history has also been much obstructed, by an immoderate indulgence of theory, which has overloaded the study with much useless matter, and many useless books. I mean not by this to depreciate just and rational theory, which is indeed, the very life and spirit of philosophy; but only to intimate, that it is a philosophical instrument, which requires to be wielded by a skillful and experienced hand; without which, it betrays into error, and leads to endless and frivolous discussions.

Nature consults no philosophers. They too seldom indeed consult her; but proceeding in her own way, she frequently disappoints their most laboured theories.

It often happens that a man conceives some general fanciful idea in natural history or in medicine; he then goes in quest of facts and circumstances to support it, and probably offers this idol to the world, by the name of his Theory, or his System. In this train, he gets immediately under the power of prejudice. He is soon disqualified to be an impartial judge, either of observation or experiment. He sees every thing through a delusive medium, and labours under a warped imagination. The slightest surmises that make for him are dignified as facts, and the strongest facts, if they militate against him, are degraded as surmises. Thus, a castle in the air is first formed, and then search is made for a foundation to support it. Such sort of procedure is the bane of philosophy. The true method of philosophical enquiry is the very reverse of this.

The real philosopher, first employs himself, in examining accurately, the phaenomena and operations of nature and of art; carefully marks their effects; traces the principles to which they lead, and by this sure, but arduous ascent, arrives at a knowledge of the causes from whence they flow. He never reasons, but from what is known. Before he attempts to generalise his ideas, he stores his mind, with the observations and experiments, with all the well-grounded facts and circumstances, relative to the subject, that is the object of his study. With this stock of solid and useful knowledge, he will then be prepared, from an extensive range of particular truths, to form those of a general nature. In philosophy and medicine, this I apprehend, should be the chief work of early life, and the great object of students at a University.

In every rational theory, few postulata ought to be required, and none but such as are at least highly probable, and perfectly analogous to the general and known order of nature. It should involve no contradiction; should possess congruity in its several parts, and be able, not only to solve the phaenomena, but to resist all objections that may be urged against it. Such, in every point, is Sir Isaac Newton's theory of gravitation.

But alas! how few other theories have been able to stand the test of these plain and reasonable demands! by being materially defective, in one or other of these prerequisites, they have almost all perished; from the vortices of Des Cartes, down to the system of Animal Magnetism. The ruin of the greater part, has generally been owing to the assumption of inadmissible postulata; this has been the sad fate of all the theories of the earth; and such is likely soon to be the fate of the celebrated theory of generation given by the Count de Buffon; which, it is to be wished, its ingenious and elegant inventor may long survive.

We are not every where, and at all times, to expect certainty in philosophy. We must often put up with an inferior degree of proof, and be contented with a probable conclusion. Even the difficulties and conjectures of wise and experienced men in philosophy, are valuable. Much more has been learnt, from the doubts and queries of Sir Isaac Newton, than from the decisions and assertions of other philosophers.

A probable opinion, delivered merely as probable, or an ingenious conjecture, to be decided by future experiment, is pleasant to the philosopher and beneficial to philosophy; but this is quite different, from attempting to arrive at certainty, by a group of uncertain and wretched speculations.

A single theoretical point, by a detail of facts to support it, properly connected, and by fair conclusions drawn, may be proved in a satisfactory manner. But a complicated theory is seldom capable, even of probable proof. Where every speculative step, rests but upon one of the same kind, the result must be a cob-web structure, that can never be depended on, nor can it ever be durable.

13. I would here beg leave to offer a few remarks on the subject of experiment and observation.

The limits between these, cannot every where be exactly defined, as they are often blended, and run the one into the other.

In general, by means of experiments, operations and phaenomena are exhibited by art, which seldom or never occur in the ordinary course of nature. New powers and properties of bodies, become thereby disclosed, and their causes discovered.

The discovery of truth by experiments, is the great merit of the moderns; for it has not yet subsisted full two hundred years. During that period, however, it has wonderfully increased the stock of human knowledge; and from the same fruitful source, a similar increase is to be expected, from age to age. By means of experiments, mechanics, hydrostatics, optics, astronomy, chemistry, and the various arts, have arrived at their present state of improvement. Natural history and medicine, have also participated of the beneficial effects. But though in both much remains to be done, in the way of experiment, yet it must be allowed, that in these sciences, there is more room for improvement and discovery, by means of observation, than in the above branches of general physics.

By means of observations, the properties of natural bodies, and the phaenomena and operations of nature are remarked and recorded; which, by induction, lead to the discovery of their causes.

The faculty of observation, like that faculty stiled common sense, is by no means so common, as is generally imagined; it is indeed to every man, the gift of nature; but it is given in very different degrees. The man of sense, is scarce more distinguished from the ideot; than one man is from another, by the superiority of this faculty. In some, it is so weak and languid, that they may almost be said to have eyes, yet see not; in others, so strong and vigorous, as almost to resemble intuition. By attention and practice, however, this, like our other intellectual powers, is unquestionably capable of being much strengthened and greatly improved.

This faculty of observation, is not to be viewed merely as a simple power of the mind; but as a combination of intellectual talents. An assiduous attention, a facility of perception, an acuteness of discernment, and a high degree of inventive genius and sagacity, are all required to render this faculty compleat.

It is by a superiority in this faculty, more than by any thing else, that one man becomes superior to another, either as a naturalist or a physician. The father of physic, Hippocrates, seems to have possessed it in a higher degree, than any other among the ancients. I have learnt concerning Sydenham, Boerhaave, and old Dr Clerk of this city, each the first Physician of his country, that in almost every case, they saw things which ordinary practitioners did not see, and that all who were conversant with them, ascribed their eminence to their superiority as observers.

The comparative merit of the numerous writers in natural history, may be fairly estimated, according to their talent for observation. This was the peculiar excellency, or as we may say, the *forte* of the celebrated Swede. In those bodies, which had been repeatedly examined and described by his predecessors, he saw properties and characters totally unobserved by them, which enabled him to give a form, entirely new, to the vegetable and animal system.

14. Observation has sometimes even its advantages over experiment.

The opportunity of executing arduous experiments is the priviledge of few, but the occasions for making useful observations must occur to every person. Much time and labour, many conveniencies and great expence, are often requisite in performing experiments. But little of these are necessary, for making even the most important observations; they require only proper opportunities, and the talent to turn these opportunities to the best account.

Experiments are often equivocal and delusive, owing generally to interfering circumstances that escape unobserved. Hence their repetition by the same, or rather by a different hand, becomes often necessary, before they can merit complete confidence. Even in conducting experiments and marking their phaenomena, it is by attentive and accurate observation that their whole merit comes to be explored.

The validity of experiments can seldom be fairly opposed, except in consequence of their repetition. But how few have the leisure or inclination to repeat the experiments of others! Whereas, to bring an observation to the test, generally requires little expence either of time or trouble. If it is fallacious, it is more easily detected than experiment; and if otherwise, its truth comes to be more expeditiously and universally confirmed.

It sometimes happens, that an observation contains the result of an experiment a thousand times repeated. Observations of this kind frequently occur in the operations of arts and manufactures. These operations are in truth so many experiments: by their frequent repetition, they convey the most solid and authentic knowledge; and their evidence must preponderate against any single or temporary experiment.

To give an instance of this kind in the art of Gardening.

It has been a matter of dispute in the vegetable physiology, whether the upper side of the leaves of plants turns constantly to the sun, in consequence of the action of his light or of his heat? Experiments, and seemingly accurate too, have been made; from whence it has been concluded, that it is not the influence of light, but the action of heat on the superior, and of moisture on the inferior surface of leaves, that gives them this general direction *.

Instead of going about to make experiments, in order to confirm or invalidate this position, we find it overthrown, and all the experiments on which it is founded, by a single observation.

In all those hot houses where the flues run upon the north wall, we have the light acting upon the south side of the plants, and the heat and dry air upon the north: Yet, even in the midst of winter, the upper side of all the leaves in the house is directed to the light; and the under side, to the heat and the driest air.

This observation is decisive of the point in question:—it is superior to all contradictory experiments upon

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* Bonnet sur l'Usage des Feuilles, p. 142.

upon the subject:—it is itself an *experimentum crucis,* performed upon a large scale, and repeated from year to year, in hundreds of different places, and in houses containing hundreds of different plants.

To the remarks now made on the mistakes which have been committed in philosophical pursuits, I must add, that the illustrious Verulam, that great restorer, I may say, that father of philosophy, planned a very different course from what has been followed by many modern philosophers. He considered sound observation, accurate experiment, and undeniable induction, as the three great pillars of all natural knowledge. The spirit of that great leader in science, was indeed caught, by Boyle and Newton, and since, by Hales and Franklin, in general physics; in natural history and chemistry, by Ray, Hook, Grew, Linnaeus, Marggraf, and Bergman; in medicine, by Harvey, Sydenham, and Haller; and it is only by treading in the paths of these great men, that philosophy and medicine are still further to be advanced.

VIII.

MEMOIRS

OF

SIR ANDREW BALFOUR.

(DELIVERED AS AN INTRODUCTORY LECTURE TO A COURSE OF NATURAL HISTORY.)

SIR Andrew Balfour was the youngest son of Sir Michael Balfour * of Denmiln in Fifeshire, and was born

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* The surname of the family of Balfour was probably derived from the ancient castle of Balfore, upon the river of Ore in Fife. From this family sprang several branches, which, at different periods, afforded many considerable men, both in arms and letters.

The head of one of these branches, Balfour of Balgarvy, who was employed upon several embassies by James VI., was created a Peer by that monarch, anno 1607, by the title of Lord Burleigh.

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born at that place, on the 18th of January 1630 †. His education at school being finished, he studied phi-

In the reign of James the II. of Scotland, James Balfour, a younger son of Balfour of Balgarvy, acquired the estate of Denmiln, in the western part of Fife, in the parish of Abdie. Soon after the death of his sovereign, this gentleman fell in the action at Roxburgh Castle; and his son John, was slain with James the IV. at Flowden Field. He again was succeeded by his son Patrick, and afterwards by his grandson Alexander, who was father to Sir Michael Balfour of Denmiln, Bart., who lived in the reign of Charles the I.

This Sir Michael, had five sons and nine daughters.

His eldest son, was Sir James Balfour, Bart., of Kinnaird, Lyon King at arms *.

His second, Alexander, was a clergyman, remarkable for many excellent qualifications.

The third, Michael, was Laird of Randerston.

The fourth, was Sir David Balfour of Foret, Bart., Lord of Session and of Justiciary.

The fifth and youngest, Andrew, was the gentleman, whose history makes the subject of this memoir.

Sir Michael, the father of the above family, lived to see his progeny amount to three hundred; and his youngest son, Sir Andrew, informed Sir Robert Sibbald, that he had seen six hundred persons sprung from his father.

† Memoria Balfouriana, p. 47.

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* This Sir James Balfour, prosecuted with great ardour, the History and Antiquities of Scotland; upon which subjects, there are many of his manuscripts still preserved in the Advocates Library. He was created a Baronet of Nova Scotia, by Charles the I., anno 1633. Previous to the institution of this order, in the year 1621, there were no hereditary knights in Scotland.

philosophy at the university of St. Andrews, where he received the degree of Master of Arts. During this period, his education was conducted by his brother, Sir James, who was no less than thirty years older than himself, and an accomplished scholar ‡. Here, his early attatchment to botany appeared, which first led him to the study of the practice of physic ||.

On his removal from the university, he went to London, about the year 1650, where he was conversant with the celebrated Harvey, Sir Theodore Mayerne, Dr Glisson, Dr Charleton, and Sir John Wedderburn, physician to the king, who chiefly directed his medical studies ¶.

Upon going to France, the year after †, he went first to Blois, where he remained for a considerable time. His inducement to visit that place, was the botanic garden of the duke of Orleans, which was then the first in Europe, and kept by the celebrated Morison. Here he contracted an intimate friendship with that great botanist, which continued unimpaired while they lived.

From

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‡ Balfour's Letters, Praef. p. 3.

|| Mem. Balf. p. 48.

¶ Ibid. pp. 49, 50.

† He went first abroad anno 1657, and did not again return to Scotland till 1665. Mem. p. 94.

From thence he went to Paris, which was for a long time his fixed residence; and where, with great ardour he pursued his education as a physician. The lectures and conversation of Riolanus, Moreau, Guenotius, De la Chamble, and Patin, the practice of the public hospitals, the opportunities of private dissection, and his studies in the botanic garden, qualified him to appear, as afterwards he always did, with dignity in his profession.

After this, he travelled through the whole of France, in company with an English knight of the name of Watkinson-Pelior, with whom he came to England, and remained for some time at that gentleman's seat in Yorkshire. On his return to France, he maintained a public disputation in the university of Caen, " De Venae Sectione in Dysenteria", when he obtained the degree of Batchelor in Medicine, and afterwards that of Doctor, in the same university, on the 20th of September 1661, in the thirty-first year of his age, and after eleven years spent in the study of medicine with the greatest advantages.

Soon after this, coming over to London, he was introduced to Charles the second; and was nominated by the king as the most proper person to travel abroad as governor to the young earl of Rochester. After four years absence, he returned with him from Italy, in the year 1667. During this tour, he endeavoured, and at the time, not without an appearance of success, to recal that abandoned young nobleman to the paths of virtue, and to inspire him with the love of learning and of study. Rochester himself often acknowledged, and to Bishop Burnet in particular, only three days before his death, how much he was bound to love and honour Dr Balfour, to whom, next to his parents, he thought he owed more than to all the world *.

From the accounts we have of him, and from his own letters, he appears to have been a studious observer of the antiquities, laws, customs, and manners, of the countries through which he passed. Their manufactures he carefully examined, of which he has given an example in his description of the salt-works of Brouage. He made it his business to visit their laboratories and shops, and to be well informed concerning their drugs and manner of practice. As a naturalist, he examined their gardens and cabinets, traversed the woods and mountains; nor suffered any extraordinary productions or phaenomena, within his reach, to pass unnoticed. His residence he always prolonged in the seats of learning. An intercourse with the men most celebrated in letters, was one of his principal objects; and their correspondence he enjoyed and cultivated afterwards in

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* Bishop Burnet's Life of the Earl of Rochester, p. 3.

in his own country. Being previous to Mr Ray, he appears, in fine, to have set the first example of a literary and scientific traveller in modern times.

We are informed by Sir Robert Sibbald, that in his Itinerary, which probably does not now exist, were engrossed the most instructive observations upon Vesuvius, the Campi Phlegraei, the Monte Nuovo, and their productions; as also upon the Italian Baths, the Bononian Phosphorus, and on his travels in the Alps *.

At Naples, he executed the most satisfactory experiments that had then been made, upon the Grotto del Cane. With great sagacity, he drew from them a conclusion, which of late years has been demonstrated by the experiments of Dr Priestley, " That the vapour of that famous grotto, is the same aerial fluid with what prevails in the coal mines of this country, by the name of the *Choke Damp.*"

Having spent fifteen years in travels of this kind, he returned home at last, loaded, as it were, with the spoils of foreign nations.

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* Mem. Balf. pp. 59, 60, 61. See also, a curious fact regarding the Bononian stone, in Balfour's Letters, p. 211.

He brought with him the best library, especially in medicine and natural history, that had till then appeared in Scotland; and not only these, but a perfect knowledge of the languages in which they were written; likewise many unpublished MSS. of learned men: A series of antique medals, modern medallions, and pictures and busts, to form thepainter and the architect: The remarkable arms, vestments, and ornaments of foreign countries: Numerous mathematical, philosophical, and chirurgical instruments, which he not only possessed but used; with operations in surgery, till then unknown in this country: A compleat cabinet, with all the simples of the materia medica, and new compositions in pharmacy; and large collections of the Fossils, Plants, and Animals, not only of the foreign countries he traversed, but of the most distant parts of the world *.

These treasures of learning, imported into a country where the like had not been formerly seen, made a considerable figure, and drew the eyes of all who had any taste for letters. But they were not so much designed for show, by the proprietor, as for use.

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* Mem. Balf. pp. 63—67. The whole plants preserved in his travels, bound in several volumes, were in his museum after it was placed in the College of Edinburgh. Mem. p. 53. But this collection, which would now be of great value, has since disappeared.

use. It was not a mere rage for collecting, that put him to so much labour and expence. These valuable materials for the purposes of medicine and natural history, he dedicated through his whole life, as he did at last, to the service of the public.

When he returned to Scotland, he took up his residence in the city of St Andrews, where he practised as a physician. Here he employed his leisure hours in the studies of anatomy and natural history. Here he first introduced into Scotland the dissection of the human body; and may thereby be considered, as having laid the foundation of any honour, that this country may have since acquired in medicine.—In the course of his dissections, he found a foetus of four months, lodged in the Fallopian tube, which was for many years afterwards preserved in his museum*.

He collected and investigated the indigenous plants of the country.—He discovered the Ligusticum *scoticum*, Linn. then unknown to botanists.—He first made known the Pulmonaria *maritima*, Linn. and the Rubus *chamaemorus*, Linn. as indigenous plants.—And the Arenaria *peploides*, Linn. he found, from much experience, to be of great power, in some cases of dysentery.

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* Mem. Balf. p. 62.

He took every opportunity of enquiring into the natural history of his own country[*].

He had the curiosity to send to the most remote islands of the Hebrides, for some of the bones which had long been currently reported to be the bones of Pygmies. But by an accurate examination he put an end to that legendary tale, and shewed them to be the bones of sea birds[†].

He examined, with still greater care, the Concha *anatifera*, or Barnacle shell, that marvellous and boasted production of the Scottish seas, in marvellous times; and overthrew the romantic ideas, which till then had been entertained concerning it. He had drawings made of the animal, and wrote an essay on the subject, which appear now to be lost. In these, however, he for the first time undeceived the learned world, who, for above a century, had been made to believe, concerning this animal, incredible things. He exposed the error, which till then prevailed, of its wonderful transformation into a bird. By an accurate dissection, he demonstrated the structure of the sucker tube, by which it adheres to sea plants and to the bottoms of ships. He was the only naturalist who had as yet observed the eggs of this animal; which he found to be of a blue colour, and upon boiling to become red: And from his discoveries declared it to be a distinct genus of testaceous animal, which only propagated its own kind *.

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[*] "The natural history of Scotland has been chiefly cultivated (begun, I might say, and founded) by Sir Andrew Balfour and Sir Robert Sibbald, Doctors of Physic; two of the greatest ornaments of their country and profession which this age has produced." Bishop Nicholson's Scottish Historical Library. Lond. 1702. p. 26.

[†] Mem. Balf. pp. 77. 80, 81.

He was the first who detected in our seas the Tetraodon *Mola*, Linn. or Sun-fish, an animal very rarely seen. He first persuaded the people in this country to eat the Anarrhicas *Lupus*, Linn. or Sea-cat; whose forbidding aspect had made them always abstain from it, but which has ever since been accounted a delicacy at the best tables.

In a letter to a friend, which seems to have been published, but has since disappeared, he endeavoured also to free the minds of his countrymen from the pernicious ideas of witchcraft, fascination, and other vulgar errors.

Dr Balfour's merit was too conspicuous to suffer him to remain long at St. Andrews. He removed to Edinburgh in the year 1670, and came immediately into the greatest practice.

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* Sibbaldi Auctarium, pp. 175, 176.

Upon his settlement here, his general acquaintance with the learned produced a more extensive literary intercourse with foreign nations, than this city had ever before enjoyed. To his countrymen who travelled abroad, his advice and recommendations were of great value, and easily obtained. Of a liberal and communicative disposition, his library, his museum, and his instructions, were open to all who had the merit to avail themselves of the advantage.

Here he performed many experiments on the transfusion of the blood of animals; a practice then much in vogue, but which ceased without any utility. He projected the manufacture of paper in this place, and was the means of introducing that valuable art into the country *.

Adjoining to his house in Edinburgh he had a small botanic garden, which he furnished by the seeds he received from his foreign correspondents: and in this garden he raised many plants, which were then first introduced into Scotland.

There lived at this time, Patrick Murray, Baron of Livingston, who had been initiated by Dr Balfour in

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* An example of the low state of the arts in Scotland in former times.—The manufacture of paper had then been established one hundred and twenty years in England: the first paper-mill having been erected at Dartford in Kent Ann. 1590. Gough's Topogr. Vol. i. p. 225.

in the study of natural history. This young gentleman, who had an ample fortune, formed, at his seat in the country, a botanic garden, containing one thousand species of plants; which at that period was a very large collection. To increase it, he travelled abroad. He traversed the whole of France, in quest of the plants of that country; and in his way to Italy, died immaturely of a fever, deeply regretted by his friend Dr Balfour, and much to the prejudice of natural history in Scotland *.

Soon after his death, Dr Balfour had his collection of plants transported from Livingston to Edinburgh; and with these, joined to the plants of his own garden, he had the merit of laying the first foundation of the public botanic garden in this city.

The necessary expences of this new institution were at first defrayed by Dr Balfour, Sir Robert Sibbald, and the Faculty of Advocates. But at length the City of Edinburgh allotted a piece of ground, near the College Church, for a public garden, and appointed a salary for its support out of the revenues of the University. Dr Balfour selected Mr James Sutherland to be the intendant of this new garden; which soon became considerable, by means of the Doctor's foreign correspondence. Plants and seeds were sent to it from Morison at Oxford,

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* Mem. Balf. pp. 45. 67, 68. 70. 79.

Oxford, Marchant at Paris, Hermann at Leyden, Watts at London, and Spotswood at Tangier; from whom many new African plants were received, which flourished in this country.

Sutherland published his Hortus Edinburgensis in the year 1684; a book I have some respect for, as it was the first on botany I ever perused, when ten years old; containing a catalogue, both considerable and accurate for that period *.

Sir Robert Sibbald mentions a letter he saw, directed to Dr Balfour, from M. Marchant, intendant of the King of France's garden, in which fifty plants were specified, which he wished might be sent from Edinburgh to the Paris garden.—So soon did this new garden become enriched with rare plants, by the influence and assiduity of its founder.

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* Mr Sutherland was not only a considerable botanist for the times he lived in, but remarkable for his skill in Antiquities. His antient medals still continue to make a conspicuous figure in the collection of the Faculty of Advocates. "The best advances in botany, made in Scotland, are owing to the extraordinary skill and industry of Mr James Sutherland, the present worthy overseer of the Royal and Physic Gardens at Edinburgh; whose happy labours, and settlement in that city, are justly registered among the many and great benefits for which she will ever be indebted to the memory of Sir Andrew Balfour." Bishop Nicholson's Scot. Hist. Libr. p. 32.

When Dr Morison, at Oxford, was about to publish his History of Plants, he found in Dr Balfour a forward and effectual patron, by whose interest many liberal subscriptions were procured among the Scots nobility, to defray the expence of the plates in that excellent work *.

His fame being now extended, he was about this time created a Baronet by Charles the Second, and appointed Physician in Ordinary to his Majesty.

His interest with the Ministers of State, and with the City of Edinburgh, appears to have been always considerable, and was always exerted for the public good, and the encouragement of merit in learned men. He had the principal hand in procuring the Mathematical Chair, in the College of Edinburgh, for Mr James Gregory, the celebrated inventor of the reflecting telescope. After his death, he procured the same office to Mr David Gregory, his nephew, who was afterwards called to be Professor of Astronomy at Oxford. And upon his removal, he had the place filled by Mr James Gregory, his brother, then Professor at St. Andrews; and who, in an inaugural oration, had there first announced the Newtonian philosophy in Scotland.

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* Mem. Balf. pp. 72, 73.

When abroad, Sir Andrew Balfour was peculiarly attentive to the institutions in the seats of learning, for the regulation of the practice of physic. Upon his settlement in this city, he saw with regret the medical art conducted in a very loose and irregular manner. Being averse to all empirics, and empirical practice, he first planned the establishment of a Royal College of Physicians in this place. And by his interest and zeal compleated that institution, which has ever since been so useful and ornamental to his country.

He was elected by his colleagues the first President of that respectable society.

The work that naturally fell to be first performed by the Royal College, was the publication of a Pharmacopœia. In this Sir Andrew took the most considerable part. The whole arrangement of the Materia Medica was particularly committed to his care, for which he was signally qualified, by his uncommon skill in natural history. This performance was first published in the year 1685, an edition now rarely to be seen, but allowed by an unquestionable judge*, to be superior to any Pharmacopœia of its aera.

Not long before his death, his desire to advance the science of medicine in his native country, joined to the humanity of his disposition, led him to project an hospital in the city of Edinburgh; till that time, the poor had never been cured of their diseases at the public expence. The institution was, at first, narrow and confined, but it continued to subsist till the days of another patriotic citizen, the late Provost Drummond, by whose zeal, this City Infirmary was enlarged, and advanced to that degree of usefulness in which you now behold it.

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* Dr Cullen.

He continued, during twenty-three years, to practice medicine in this place, with higher character, and with more emolument, than any former Physician in Scotland. But though Sir Robert Sibbald is profuse, in praise of his skill, of his prudence and success, yet he acknowledges that he was not without his traducers. "Lucripetae quidam Practici," as he terms them, endeavoured, on many occasions, to detract from his high and well-earned merit. These, however, were entirely overlooked, by the high-minded and disinterested Balfour; who, as Sibbald expresses it, "ad opes et honores, gradu composito, "per virtutis semitam, incederet*."

When about thirty years of age, he languished for a long time under a slow fever at London. From that period, till he arrived at the age of forty-three, he enjoyed perfect health; but soon after this, his health became variable, and his constitution sickly. He died anno 1694, in the sixty-third year of his age, after a severe conflict with the gout, and other painful disorders; which gave him an opportunity of displaying, upon the approach of death, those virtues, and that equanimity which had all along been so remarkable in his life*.

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* Mem. Balf. p. 84.

His person, like his mind and manners, was elegant; he was possessed of a handsome figure, with a pleasing and expressive countenance; of a graceful elocution, and by his natural disposition, as well as by his long intercourse with the higher ranks of mankind, of a most courteous and polite demeanour†. There was a print of him executed at Paris, which was in the hands of his son, but it is now unknown if any copies of it exist.

Along with natural abilities of the first class, he seems in literary attainments to have excelled all his countrymen, of the aera in which he lived. Sir Robert Sibbald expresses himself concerning him, in the following terms: "Sapientia certe, animi moderatione,

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* Mem. Balfour, p. 90.

† Ibid p. 92. His most intimate friends among people of rank, were the Duke of Rothes, the Earls of Murray, Morton and Strathmore; his relation the Earl of Middleton, Mem. p. 87.; the Viscounts of Stormont and Tarbat, Sir John Murray of Drumcairn, and Sir Charles Scarborough the King's Physician at London.

" ratione, et humaniorum literarum cognitione, mul-
" tos anteibat; historiae vero naturalis, et rei Anti-
" quariae peritia, omnes superavit; in hisce studiis,
" Scotorum primus*.

Nor was his character less conspicuous as a man, than as a scholar. Pious and virtuous; noted for the candour and generosity of his mind; for his benignity, munificence and public spirit; his whole life seems to have been a series of public and private offices to God, to his king, to his country, and his friends; and he seems, in fine, to have possessed all the virtues that enter into a great and good character.

His library and museum were forty years work, of unremitted attention†. For their better accommodation, he built an addition to his house, when he had arrived at near his sixtieth year; but after the building was compleated, he became so infirm as to be unable to put them in that order which he intended.

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* Memor. Balfour. p. 86.

† In his library, he had always many duplicates of rare and valuable books for the gratification of his friends, and colleagues. At a visit paid him by the Duke of Lauderdale, in which the conversation turned upon the Greek classics, he presented the Duke with some of the most ancient scholiasts upon the Greek Poets, which the latter had not been able to procure. Sibbald.—Mem. p. 67.

After his death, his library, consisting of about three thousand volumes, besides manuscripts, was sold, of which there is a printed catalogue that still remains.

His museum was deposited in the College of Edinburgh, in the hall, which is now the library; and there is reason to think it was then the most considerable that was in the possession of any University in Europe. There it remained for many years, useless and neglected; some parts of it going to inevitable decay, and others abstracted. Yet even after the year 1750 it still continued a considerable collection, which I have good reason to remember, as it was the sight of it, about that time, that first inspired me with an attachment to Natural History. Soon after that period, it was dislodged from the hall where it had been long kept; was thrown aside; and exposed as lumber; was further and further dilapidated, and at length, almost compleatly demolished.

In the year 1782, out of its ruins and rubbish I extracted many pieces still valuable and useful, and placed them here in the best order I could. These, I hope, may now remain long in this place, and be considered as so many precious relics of the first naturalist, and of one of the best and greatest men this country has produced.

His letters, his consultations, and medical cases, the description of many dissections, and other papers; several of which, no doubt, related to Natural History, were left in the hands of his son, and are now probably lost*.

From the account that has been given of Sir Andrew Balfour, every person conversant in natural history or medicine, must be led to regret that he never appeared as a writer. His kinsman, Sir Robert Sibbald ascribes this to the dislike he had to any work that was not finished in the highest degree. Neither his time nor his health admitted of this. His fame in his profession had risen to the greatest eminence, without the aid of publication. He was become, perhaps, too great a judge to risk the judgement of others, and was thereby withheld, as many of the best qualified men have been, from being an author.

He had written a series of familiar letters to his friend Murray of Livingstone, to direct him in his researches while abroad, which contained indeed a sort of history of his own travels. These, he sometimes shewed to his intimate friends, but would never consent to their publication. After his death however they were printed by his son, and dedicated to the Earl of Murray, his father's particular friend, with a preface by Sir Robert Sibbald*.

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* Memor. Balfour. p. 82.

This small work, now become scarce and little known, contains the first specimen of literary and philosophical travels: a species of writing, by which the world has ever since been highly entertained and instructed. He was immediately followed in this line by Mr Ray and Dr Lister; these again by Addison, Bouguer and Condamine, succeeded by the Swedish naturalists, Kalm, Hasselquist, Osbeck, Loefling, and others; and in our own time, by Bernoulli, Ferber, Born, Pallas, Forster, and Sparmann, who have made greater additions to the general stock of useful knowledge than perhaps any other set of writers whatever. There is no science nor any art but what may receive improvement from the skilful traveller.

It appears that Mr Murray, in the course of his travels, had transmitted to Sir Andrew Balfour an account of his progress; which seems to have contained the natural and oeconomical history of England and France, written during the three years he was employed in the examination of these countries. Unfortunately, this work, which could not fail to be interesting, never was published. We are certain that it was extant in the year 1700, but appears now to be irrecoverably gone[*].

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* Letters written to a friend, by Sir Andrew Balfour, M.D. Edinburgh 1700, 12mo.

After the detail now given of this gentleman's life, I persuade myself, that it may be allowed to be a life worthy of being recalled into view; and perhaps at no time, nor in any place, more proper than the present.

To introduce the dissection of the human body into this kingdom, at a very superstitious period; and the first hospital for the relief of disease and poverty at the public expence:—To be the founder of the botanic garden; and I may say, of the science of botany, in this country:—Of the royal college of physicians; and I may say, in effect, of the school of medicine, in this place:—And to leave, as a bequest to the public, a museum, which, at the time, would have been an ornament to any university, or any metropolis.

These were the certain features of an enlightened mind, and of an excellent heart. They were great works for a private man to accomplish: and for which, surely, his name deserves to be had in honour.

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[*] Sibbald's Pref. to Balfour's Letters. pp. 6. 10.

To the character of the most eminent physician in this country, we find added, those, of a consummate scholar, of an able philosopher, of an accomplished gentleman, and of a patriotic and beneficent citizen:—A group of qualifications, which, to my view at least, forms one of the most respectable characters in human life.

Concerning a great part of this audience, therefore, whose views may be directed to the same profession, I surely cannot form a better wish, than that they may go, and do so likewise.

IX.

THE

NATURAL HISTORY

OF

LOCH-LEVEN.

LOCH-LEVEN, in Kinross-shire, is situated in an extensive valley, having the highest of the Lomond hills towards the east, and on the south the hill of Benarte. This hill is of a truncated shape: and the Romans are supposed to have been encamped on its extensive summit, when the Ninth Legion was defeated in a night attack by the Caledonians.

The greatest length of the lake is about five computed miles; and its breadth varies from one to three miles. Its circumference was once measured by a wheel on the ice, when it was found to be about fifteen miles. Its extent is computed to amount to about three thousand six hundred miles.

It is in general shallow; its greatest depth to the west of Queen Mary's isle being from twenty to thirty fathoms. The greatest rise of the lake, during a rainy season, is about four feet, compared to its greatest fall in the heat of Summer. On the 18th of September 1797, in a rainy season, the lake was two feet and a half higher than it commonly is at that time of the year, and as high as it frequently is during winter.

It is said by the inhabitants, that in the invasion under Edward of England, the castle on the island in the lake held out obstinately, and remained unreduced. The English, in order to gain it, are said to have formed a great rampart of earth and stone where the lake empties itself into the river Leven. This was done with a view to dam up the waters of the lake, and to inundate the castle. But it proved ineffectual; for the rampart gave way, and occasioned a most destructive flood in the river Leven. In confirmation of this traditional account, the remains of the rampart are affirmed to be still seen at the place.

This lake is most remarkable for the variety, quantity, and excellence of the fish which it contains.

It is not known, that any lake in Scotland, of equal extent, is so productive of excellent fish. It may be proper, therefore, to consider particularly the different sorts which it affords.

1. The first, which is the most frequent, is called at the place the Grey Trout *; and is a fish not distinctly described by naturalists. It is found usually from one to two pounds weight, but sometimes of a much larger size.

2. The second is called by the inhabitants the Bull Trout †. It is supposed to be a distinct species; but there is reason to suspect that it is only the male of the above Grey Trout. These two are generally known at Edinburgh by the name of Loch-Leven trout. When in season, they are as red in the fish as salmon, and are preferable to every other trout found in the lakes or rivers of Scotland.

3. The third is called at Kinross the Camduy. This trout is usually caught from eight to eleven inches long. It is reckoned by the inhabitants a distinct species; but on examination it was found to be only the Grey Trout in an early stage of its growth, and before it arrives at maturity.

The

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* Salmo *Levenensis*. N.

† Salmo *Taurinus*. N.

4. The fourth fish in this lake is called the Gullybroch. This is the male of the Char[*], a fish highly and justly esteemed, and no where found in greater perfection. It is sometimes taken here twenty inches long and upwards.

5. The fifth fish in this lake is termed by the fishers Seconde. Its general appearance being considerably different from that of the Gullybroch, it is therefore accounted a distinct species; but it is in fact only the female of the Char. In the Loch-Leven trout, in the char, and probably in other fishes of the kind, the male appears to grow to a larger size than the female.

6, 7. Besides these sorts of trout, there are two others found in the lake and in the rivers which run into it. The one is what is commonly called the Burn Trout[†], frequent in all our rivers. The other is distinguished from it in some places by the name of the Highland Trout[‡], and is called at Kinross the Muir Trout.

8 There appears also to be another species of trout in this lake, of which I could not obtain any certain information. Though it is also called Bull

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[*] Salmo *Alpinus*. Linn.

[†] Salmo *Fario*. Linn.

[‡] Salmo *Montana*. N.

Trout, it is accounted different from the fish above-mentioned by that name. It is found only in the lower part of the lake, and for a mile or two in the river Leven, where it is deep and almost stagnant. It is sometimes found seven or eight pounds weight and upwards, and its fish is neither red nor white, but of a yellowish cast.

9.—10. There are also found in Loch Leven the perch and pike, but the latter is not so numerous as in many others of our lakes.

11. The lake also contains the common eel in great numbers, and of a large size. In the lower part of the lake, and in the stagnant part of the river Leven, it is fished in great quantities, chiefly in the month of September. The fish, however, does turn to much account; the eel not being here in such request as in other countries. The shallow parts of the lake contain a great variety of water weeds, and especially the zanichellia. According to the information of the fishermen, this last plant, which fotms a turf at the bottom, is chosen by the eels, as the place for depositing their spawn.

According to the information of the country people, here the eels descend in the river Gairnig into the lake in a very singular manner. This river is very is very rapid and precipitous in its course; especially in a flood, when the eels appear to be forced down by the violence of the current. They do not swim, however, or proceed at their full length, but roll themselves up in the form of a ball, and in that way are carried down into the lake.

These are the most remarkable fishes in Loch-Leven, and amount at least to eight different species; but it no doubt contains a number of smaller fishes, that pass unobserved by the inhabitants.

The fish of the grey trout, the bull trout, and the char, is remarkable for its bright red colour. This is ascribed by some to the peculiar nature of the food which this lake affords: but it is a property natural to these fishes; and is to be observed in all the other lakes where they are found. The fish of these species is white while they are yet young; and the redness gradually increases till they arrive at maturity, in the same manner as may be observed in the salmon.

The remarkable fertility of this lake in fish, is chiefly to be ascribed to a great extent of shallow water.

This is productive of an extensive growth of aquatic plants, which serve as food to great numbers of aquatic animals, in their turn affording an abundant supply of food for the fishes. The lake particularly contains several species of aquatic testaceous animals, whose shells are sometimes thrown out upon the shore in considerable quantities, and which are well known to be the favourite food of fishes. I wished to have determined the species of these testaceous animals, but the water of the lake was so high that none of them could be found on its shores.

Before the year 1780, the fishing in this lake rented annually at £. 13 sterling. About that time the fish began to be carried regularly to the Edinburgh market which occasioned an increase of rent.

In the year 1797 the fishing was carried on by means of two boats, and was rented at £ 123 sterling.

The Lochleven trouts and the char sell at Kinross at four pence the pound, and at Edinburgh for about six pence. But the perch, pike, and eel, sell on the spot only at two pence the pound*.

The net used at this place is fifty fathoms long and fourteen feet deep, with a bag or hose at its centre. It has an hundred and fifty fathoms of rope at each end, and catches no trout under ten inches in length.

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* A grey trout, a bull trout, and a char of about a pound weight, the fishers reckon to be fish of four or perhaps five years old, but they account the perch to be much slower and the pike to be more rapid in its growth.

The net being coiled up in the stern of the boat, one of the ropes is left ashore fastened to a log of timber. The boat makes a circular sweep and drops the net, when the rope at the other extremity is brought to the shore. The extent of this net and rope forms a laborious pull for two men, and is a net of the best dimensions and construction for lake fishing.

The island on which the castle stands, contains between two and three acres. It has upon it the remains of some very old ash and thorn trees seemingly nearly coeval with the aera of the castle: Which from its form appears to have been built about the time of James II.

The largest of these thorns, a foot above ground, measured in circumference seven feet two inches; and one of the ash trees, fourteen feet eight inches, at the height of four feet above ground.

The castle, which is still pretty entire, is in the form of an oblong square. The ground floor is vaulted, and has never had in it any fire place. The second had served as the kitchen. The third contained the hall which has a large fire place, and in the window there are stone benches. Within walls it is about thirty feet long and twenty-one broad, the walls being every where about six feet thick. The fourth and fifth stories contain the dormitory and the communication from the lower to the upper stories was only by means of a very small winding stair. The keep of the castle is an oval, the long diameter of which may be about sixty yards. The wall which surrounds it is very strong, and still pretty entire, consisting like the castle of good ashler work. On the east side of the wall there is a circular tower consisting of three stories, and on the inside there had been several other inferior buildings. The whole of this castle, which is very large, is built of grey sand-stone, which had been brought in boats from the opposite shores at a very high expence. The whole walls are covered with wall-flower.

The island of St Serf is situated towards the eastern side of the lake. It contains about thirty acres, and had upon it the Priory of Lochleven dedicated to St Servonus; but of this only a small part of the ruins now remains.

The house of Kinross was built by Sir William Bruce, a gentleman noted in the reign of Charles the Second for his skill and taste in architecture. He planned the Abbey of Holyroodhouse, the back front of which is the largest and most correct piece of Greek architecture we yet have in Scotland. His house at Kinross was finished in the year 1684. On the lawn in the front of the house, there is a walnut tree, which, four feet above ground, measures ten feet nine inches in circumference. It is probably the oldest and largest tree of the kind in Scotland.

POSTCRIPT

POSTSCRIPT

TO

LOCH-LEVEN.

Plants.—By the sea side, and on the hills in the neighbourhood of the North Ferry, there are a number of plants not common in other places, of which I made a list in the year 1761. The most remarkable is the Astragalus *uralensis*, Linn. This I first supposed to be the *alpinus* of Linnaeus, but having received a specimen of that plant from Dr Solander, who brought it from Lapland, I found this Ferry plant to be the *uralensis*.

On the hills west from the North Ferry, I found the Sweet Briar growing wild, and in great plenty. There is no gentleman's seat nor any old gardens near the place. The plant has here all the appearance of being indigenous; and I have no where else seen it in Scotland with this appearance.

Fossils.—In the year 1758, in making the road leading from the North Ferry, by cutting a rock, a small string of lead ore was discovered: it was pursued into the adjacent grounds when it became wider: it was washed for sometime by a drift from the sea shore, but not becoming more considerable was given up.

The road leading from the North Ferry to Kinross, rises, at one place, about eight hundred feet above the sea; and, yet here the coal, and coal strata prevail. There are few, if any places in Scotland, where coal is to be found at so great a height. This coal continues in some degree to within four miles of Kinross.

On leaving Kinross, and the coal country by the road to Perth, the red free stone prevails for several miles with which the houses are chiefly built. From thence, the road passes over a range of hills till we descend to the bridge of Earn. These hills are all composed of the Wacken, the same species of rock with that of the Calton hill at Edinburgh, and of the Garleton hills in East Lothian.

Moncrief hill, between the bridge of Earn and Perth, is about five hundred feet above the sea.

Its Summit affords, certainly the finest prospect on the east side of Scotland; and, perhaps, though in in some shape excelled by that from the castle of Edinburgh, is far superior to that from the castle of Stirling.

The top of this hill is a place of great natural strength to be occupied by an army. It was no doubt garrisoned by the Romans when they reached the Tay, which they first did at Perth, and was probably their station *ad Taum.* It affords a distinct view of a great extent of country on all hands—a situation which they always selected and preferred.

On the Summit of the hill, the foundation stones of buildings are still to be perceived, but to what aera they are to be referred is uncertain. It is one of those remarkable posts in the country which fell naturally to be occupied by an army, and especially before the invention of gun powder.

The western extremity, and the highest part of this hill is composed of black Whin Rock, the Siderpoecilon *Arcium.* But about the skirts of the hill, and towards the east end, the Agate Rock, or Sarnius *onychiferus* takes place, which composes, almost entirely the opposite hill of Kinnoul, on the other side of the Tay.

Animals.—At Moncrief house, I found the following insects in Lady Eliza Moncrieffe's possession, all collected by herself.

Papilio *Antiopa*, Linn. the Camberwell Beauty. She has found it in two places; the one in the neighbourhood of her father's castle of Dalhousie, and the other, at Mr Guthrie's house of Craigie, about two miles from Dundee.

Phalaena *Pavonia*, Linn. the Emperor. Figured in Harris's Aurelian, from Auchtertyre in Strathern, with two webs, and cases of the Pupae fastened upon the common heather.

Papilio *rubra*, Linn. with the underside of the wings green. The same, I think, with what I once found among the oak wood on Kinnel water in Annandale.

Sphinx *Alpenor*, Linn.
Populi, Linn.
Tiliae, Linn.
Stellatarum, Linn. These four species of Sphinx, she has found at Moncrief and other places in Strathern.

Phalaena *Aglaja*, Linn. from Auchtertyre.

The insect I received from her as the Phalaena *plantaginis*, Linn. is different from the Plantaginis figured by Harris.

Papilis *Maera*, Linn. the Wall. This I found at Moncrief the 22d of September.

I received also from her, the Phalaena *Psi*, Linn., or Grey Dagger of Harris, found at Moncrief.

Fossils.—All about Raith, and in the tract of Fife from Dysart to Aberdour, and for several miles inland, the Sideropoecilon *fatiscens*, and the Secondary Limestone appear in many places almost contiguous. At St. Ninians Chapel, two miles west from Kirkaldy, there is a great body of Limestone on the north side of a small brook.

It is disposed in parallel strata, but a little inclined to the horizon. It has a cover of six feet of loam, and has in one place been worked to the bottom, which is about thirty feet below the surface: but on the south side of the brook, and not a hundred yards distant, the black Sideropoecilon *fatiscens* abounds in thick vertical strata.

X.

MINERALOGICAL JOURNAL

FROM

EDINBURGH TO ELLIOCK,

55 MILES.

From Edinburgh to Brighouse, 16 *Miles.*

1. At Hillend Snab, five miles from Edinburgh, at the extremity of the Pentland Hills, the road is cut through a black rock, the Sarnius *onychinus*, containing small nodules of Onyx, and other Lithidia. There is to be found also on this rock, small parcels of the Amphitane *onychina*, an indurated Terre Verte, which frequently accompanies the nodules of Onyx, and is called, in Cronstedt, the *Agate Gall.*

2. The summit of the Pentland Hills, above Hillend-Snab, called Kirkettan Craig, is entirely com-

posed of the Cyamea *pictlandica*, a white simple rock, which I have never observed any where else in Scotland. The rocky face of the hill appears white at Edinburgh; and it was from this stone that the late Sheriff Lind manufactured a sort of china.

3. On the south bank of the river of Glencross, and about a mile above the bridge on the high road, seven miles from Edinburgh, there is a bold wide vertical vein, filled entirely with a reddish Spatum *ponderosum*. Some masses of it have the Cock's-comb crystals formed upon them.

4. About a quarter of a mile beyond Carlips Bridge, close by the road, on the right hand, there is a quarry in a black rock, whose veins and fissures are filled with the Achates *venigenus*. This stone is to be found from half an inch to a foot in thickness. It is composed of stratula consisting of different sorts of agate matter, more or less pure. The formation of agate in veins is considered by Engestrom, in his notes upon Cronstedt, as a rare and even dubious production. This is the only instance of it I have seen in Scotland.

5. About twelve miles from Edinburgh, the house of Newhall stands on the left hand of the road. The river North Esk runs behind it; and, between the house and Newhall mill, about half a mile above, the river runs over beds of limestone which contain pe-

trified shells, entrochi, tubularias, and other extraneous fossils.

6. Between Newhall mill and Carlips bridge, and within sight of the road, on the left hand, there are vertical strata of black shale, on the south bank of the river, which contain in abundance the Cissites *Sclopeti*, or round black yolkstones, generally of the size of pistol or musket bullets.

7. A little beyond the farm of Carlips, about a gunshot from the high road, on the right hand, there is a coarse till-band, or plumb-pudding stone, which, amidst a great variety of rounded nodules, contains many of onyx and sardonyx, but generally imperfect and much cracked. It is the Blotta *onychina*.

8. The whole of the Pentland hills, on this road, from Lothian burn to the river Line, a tract of about eleven miles, consist entirely of primitive strata. But the valley at the foot of the hills abounds in sandstone, limestone, coal, blaes, dogger, and other secondary strata. These approach the mountains, and at their feet overlap the primitive strata, but are not to be found any where upon the mountains themselves.

9. On the high road, at the southern extremity of the Pentland hills, and within a mile of Brighouse, are the remains of old mines, called the Silver

Holes, where formerly a considerable quantity of lead had been extracted. In the heaps, you may observe every where a whitish yellow stone, the Tephria *plumbifera*, which is very frequently found accompanying lead in this country. It seems to be almost the only stone that has been thrown out of these mines, and has composed the walls of the veins.

In the fractures of this stone you will find a very beautiful black arbuscular delineation, the Dendrites *tephriae*.

These mines were endeavoured to be recovered by Mr Ronald Crawford in the year 1756, but without success.

10. Upon the river Line, near the Brighouse, there are extensive strata of a grey argillaceous rock, the Thyites *linensis*. It is a secondary stratum disposed at an angle of about 45° to the horizon. It imbibes water greedily and falls 'to powder in the air.

From Brighouse to Biggar, eleven miles.

1. After leaving Brighouse, there are small hills on the road opposite to Dolphinton, which are composed of strata of sand and gravel. There is no

rock to be seen near the road, but it is made in several places with whinstone.

2. The boundary between the two counties of Tweeddale and Lanark divides the two valleys of Broughton and Biggar. From this boundary, Lanarkshire stretches down to Glasgow above forty miles, and is composed of deep clay soil in the course of the Clyde. But the country on the opposite side of this boundary, in the course of the Tweed, is more hilly and of a very different nature. The soil is light and nowhere deep, and partakes little of clay for forty miles to the town of Kelso.

From Biggar to Abington, thirteen miles.

1. Soon after leaving Biggar, loose masses of a flesh-coloured jasper, the Elatites *carneus*, are to be observed in the gravel pits.

2. No fast rock is seen till you pass the river of Coulter, and from thence to the river of Duniten, no other is to be observed but grey whinstone.

3. Immediately below the bridge, over the river of Duniten there is a bank of gravel, in which there is one thin stratum cemented with a black ochre of iron, the Melanteria *stratosa*.

4. In this gravel bank are also found the following stones in loose masses.

α. Calomachus *quadratus*. A shorl rock composed of a soft white quartz, and large granules of black shorl, generally of a square shape. I never saw this stone but in the river of Duniten. There are probably fast rocks of it towards the head of the river.

β. Leucostictos *purpureum*. A porphyry of a livid purple ground, with white spots of feldspat, and a few of black shorl.

γ. Lydius *coeruleus*. A touchstone of a dusky blue colour.

δ. Lydius *purpureus*. A touchstone of a dark purple colour. Both this and the former have evidently been formed in veins, and contain some small strings of quartz.

From Abington to Lead-hills, six miles.

1. The high mining country of Lead-hills and Wanlock-head occupies a space which does not exceed two miles in length, and one in breadth. This tract during one hundred and forty years has produced prodigious quantities of lead; and iron, copper,

per, zinc, silver and gold are also frequent in it. I have approached this metallic tract by five different roads, and have found the access to it in all these directions marked by three circumstances.

α. When you come within three miles of it you find masses of quartz in greater abundance than at a greater distance.

β. The disseminated gold gathered in this part of the country is also found to the distance of about three miles from this tract, but not beyond it; especially in the brooks of Glengonnar, Short Cleugh, Menock and Wanlock.

γ. At the distance of about one mile from this tract, you begin evidently to enter a mineral country, compared to what you have passed. On the side of the road you see every where, a deep stratum of earth, mixed with fragments of a shivery stone, of a brownish or yellowish colour, and of a burnt appearance. This stratum you find also in great abundance within the mining district, and it is every where unfriendly to the growth of grass and all vegetables.

2. When you come within a mile of Leadhills, masses of a whitish yellow stone, the Tephria *plumbifera*, appear in abundance. They wrought lately through a great stratum of this, in the Susanna vein,

at the depth of about one hundred and forty six fathoms.

3. At the same distance from Leadhills, you find abundance of loose masses of the Nicomia *livida*, a sort of chert resembling flint, of a livid black colour. Yet no fixed rock of this kind was ever discovered at Leadhills, till about seven years ago, when they had to work through a stratum of it in the low level, at a great expence; the stone being so hard and solid as to cost in working, from 9 to £.12 per fathom.

4. The sole of the Susanna vein is now fifty-two fathoms under level, that is, under the bed of the brook of Glengonnar, at the smelting houses. The vein has been worked ninety-six fathoms above level from the Shaft on the top of Glendorch. The whole amounting to one hundred and forty-eight fathoms, the greatest depth to which the earth has been perforated in Scotland.

From Leadhills to Elliock, nine miles.

1. After travelling through the narrow pass of Menock-hause, the metallic veins terminate, and a rapid descent to the south takes place. In descending from this pass for some way, you find the above burnt mineral soil, and veins and masses of quartz. These disappear upon descending further, after

which nothing is to be seen all the way to Elliock but grey Whin Rock.

2. This road down the Menock, in a narrow steep valley, among high mountains, affords a beautiful illustration of M. Bourguet's obsérvation, on the correspondence between the salient and receding angles of mountains.

XI.

MINERALOGICAL JOURNEY

FROM

EDINBURGH TO LONDON.

SECT. I.

From Edinburgh to Berwick.

After leaving the King's Park, there is no appearance of whin-stone on the road to Haddington. There are pits of blue clay, with brick-works, between Jock's Lodge and the Duddingston coal works. The depth of the clay here is unknown, but is everywhere covered with sea sand, from three to six feet thick.

At Duddingston coal work the freestone appears, which is to be seen in several places, for two or three miles, running towards the sea, at a small angle to the horizon. The coal at Duddingston, Pinkie, Falside, and other places in the neighbourhood, stretches into the sea under this freestone.

From Haddington to Berwick the road is all made of gravel. There is no whinstone to be seen from the King's Park, till you come upon Coldingham Moor, where it appears only for two or three miles, in large masses, upon the surface, and in the soil, especially about Ayton. This moor is a distant excursion of hills, and forms a ridge declining towards the sea. Drumpender Law, a hill of about four hundred feet high from its base, which stands in the adjacent flat country, is of whinstone.

All the country from Haddington to Berwick, excepting Coldingham Moor, is of a deep soil. In some places there are deep beds of gravel, which are laid open to the depth of twenty or thirty feet. In others, there are extensive beds of loam, intermixed with large stones; as at the Pease, where the high road lies above sixty feet deep in such a stratum. It is to be observed, that in all the deep beds, both of gravel and loam, in this tract, the stones in them are of different kinds, both of whinstone and freestone. There is no coal further east than that of Penston, discovered on the Scottish side. Limestone in this tract is very frequent. All the shores about Dunglass, and to St. Ebb's Head, are of freestone, intermixed in some places with limestone, and afford some petrifying springs.

SECT. II.

From Berwick to Durham.

Upon leaving Berwick, the whole country is freestone, running towards the sea, at an angle often of about fifty degrees to the horizon. There are coal-pits upon the road about two miles from Berwick; also about five miles south from Belford, and in several places between Alnwick and Morpeth, and beyond that place. So that there appears to be a continuation of freestone and coal country from Berwick to Newcastle, and from thence to Durham.

In many parts of this district there is plenty of limestone. Between Belford and Morpeth, the road in several places is made with blue limestone, so hard, that it does not break down, but forms a rugged causeway when the upper cover blows off.

The freestone between Berwick and Morpeth, used for the high road, is equally hard; and hence the buck-toothed road in many places, especially between Berwick and Belford. The freestone, again, laid on the road between Morpeth and Northallerton, is in general soft, breaks easily down, and hence the road between these places is for the most part sandy.

Obs.—In those parts of Northumberland and the Bishopric where there is no coal, the freestone is of a grey colour, and of a durable substance. But where the coal abounds, as about Newcastle and Durham, the freestone is generally ochrous, of a yellowish colour, and wastes to a great degree in the air. Witness the fine Cathedral of Durham, where the carved work upon the statues is not only wholly disfigured, but the very hewn stones in the wall are eaten away in some places above half a foot deep.

SECT. III.

From Durham to Stilton, 194 *Miles.*

From Durham to Darlington there is no rock to be seen but freestone. Its strata are nearly horizontal, with a very thick staple above them. Some deep gravel pits appear; but the gravel they contain, and likewise that of the channel of the river Were, is composed almost entirely of freestone.

From Darlington to Borroughbridge the road is so shut up with hedges, that only some beds of gravel are to be seen between the two places.

At Borroughbridge a whitish limestone becomes the general stratum under the staple, which is usually from one to three or four feet deep.

The upper part of this stratum is a soft cliffery rock, with which the road is made. It breaks down and cakes exactly like soft whinstone. This limestone continues to Doncaster.

Between Doncaster and Foston in Lincolnshire, this limestone disappears; at least it lies not anywhere so near the surface as to be worked. The soil and the road are sandy; and deep strata of sand are to be observed in some places, mixed with gravel.

At Foston, again, the same general stratum of whitish limestone appears, and continues in the same manner as before, till within five miles of Stilton.

SECT. IV.

From Stilton to London, by Cambridge.

Five miles short of Stilton, a deep clay soil takes place, and continues, with little variation, to Cambridge: but there are also deep strata of sand and gravel, with which the roads are made.

Two miles south from Cambridge, a stratum appears perfectly new, and nowhere else to be seen between this place and the northern extremity of Scotland. This is a stratum of gravel, immediately under the staple, and consisting chiefly of flint. With this gravel, the walks in the University, and the roads about the town are laid.

Four miles south, after the first appearance of the flint gravel, and six miles from Cambridge, another stratum takes place for the first time, chalk. In many places, the chalk comes up to the surface, having only a foot of staple above it, and sometimes less. At other places it has a stratum of flint gravel above it. The chalk continues in this way till you arrive at Ware; and the roads in this tract are laid with flint gravel at bottom, and a cover of chalk above. From Ware to London, no rock is to be seen but only strata of flint gravel and common gravel, of great depth in some places, with which the roads are made.

Corollaries.

1. All the strata in a flat country are horizontal, or nearly so.

2. The strata are more extensive, uniform and unbroken, in a flat, than in a hilly country.

3. The staple is always deepest in a flat country, where the strata are horizontal and extensive; except where chalk and flint gravel prevail.

4. There are no limits between chalk and limestone. They are only gradations of the same stone.

5. Chalk often contains a horizontal stratum of flint in loose masses, from one to fifty pounds weight as in the Irish limestone. Each stratum has only the thickness of one of these masses.

6. Sand, clay, gravel, sandstone, limestone, coal, chalk and flint, are the proper fossils of a flat extended country, and the only ones to be observed on the high road between Edinburgh and London.

XII.

SALICETUM.

THE BOTANICAL HISTORY AND CULTIVATION OF WILLOWS.

GENERAL OBSERVATIONS.

1. **Theophrastus** observes, that the trees which grow naturally in a dry situation are longer lived than those which are the produce of wet soils. The observation is peculiarly just concerning the Willows. They are the shortest lived of all the native trees in our climate; but the shortness of their duration is in a great measure compensated by the quickness of their growth.

2. In some species a thick cluster of leaves in the form of a rose is formed in summer at the extremities of the branches. And in winter, after all the leaves of the trees are fallen, these remain, though in a withered state. This production, however, makes no essential part of the plant, neither is it confined to one particular species. It is merely accidental, and occasioned by the puncture of an insect. This appearance has been observed on the Salix *alba*, *fusca* and *helix*, Linn. but most frequently upon the last, and wherever it takes place, the plant usually passes by the name of the Rose Willow.

3. In the Salicta or Osier holts of the Romans, the following species were chiefly cultivated. Salix *alba*, *vitellina*, *vimenalis* * and *helix*, Linn. and *amerina*. N. These are all of southern extraction, and from the Willow plantations of the Romans, in Italy, have been propagated, in the course of ages, over all the northern countries in Europe.

4. It would in many places be very serviceable if Willows could be made to succeed on the sleechy sides of tide rivers, where it is difficult to raise any other trees. But of this only one instance, and that an unfavourable one has occurred. By the side of a sleechy

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* These Willows, especially the three first, being remarkable for their glaucous appearance, are alluded to by Virgil.

Et glauca canentia fronde salicta (Georgic. 2), a sleechy brook, at its entrance into the tide, Mr Alexander, Minister of Kirkbean, planted a fence of the white and grey Willows, the roots of which were frequently overflowed by the tides. These plants though seemingly in a good situation for Willows, dwindled away and came at length scarcely to bear leaves for two or three years, when they died.

BOTANICAL HISTORY.

5. Among the ancients, and the more early modern botanists, the Willows were distinguished by vague and trifling characters, insufficient to determine their species. They were only distinguished by the places where they grew, by the colour of their bark, by the brittleness or toughness of their twigs, and by the uses to which they were applied. J. Bauhinus was the first person who described them by characters drawn from their leaves and fructification.

As there is no genus of trees equally numerous, nor any genus of plants so copious, and yet stamped with so little diversity of character, the Willows necessarily require, more than almost any other tribe, the most ample and accurate discrimination. The unmeaning names of authors, their imperfect descriptions and figures, their slight and inaccurate characters, and the vast number of species; their numerous and nameless varieties, and the different phases belonging to the different sexes of each species, all conspire to render it the most difficult and inextricable genus in the vegetable system.

6. The Willows in general are endowed with stipulae, but in a few species none can be discerned at any period of their growth. These generally have two glands at the base of the pediculi where the stipulae are commonly situated. In some species, the stipulae are not only minute, but fall off so quickly, that they are to be observed only at a few of the very youngest leaves. By not attending to this, some Willows, which really have stipulae, have been placed among the number of ex-stipulatae.

7. The colour on the underside of the leaves of Willows is always different from that of the upper side, and is always whiter or of a more dilute green. The whiteness proceeds from two different causes; sometimes from white villi, at other times from a minute white powder or velamen spread over the surface of the leaf. They are easily distinguished, as the velamen can be easily rubbed off with the finger, which is not the case with the villi.

In some leaves the underside is of a fainter green colour, without being covered either with villi or a velamen.

8. Caspar and John Bauhine, among their other meritorious services in the science of botany, first began to distinguish the Willows by their degree of growth, whether trees or shrubs, by the figure of their leaves, the nature of their flowers and fruit, and had the peculiar merit first to discern, that in each species there was a fertile and infertile individual.

9. The young shoots of the Willows, like those of most other trees, move forwards at the extremity in a spiral line. By this mode of growth, the leaves which are disclosed come to be placed on the branch in a spiral order. In some trees three leaves, in some four, in some five, in others six, and even nine leaves are required to complete the spiral. When a straight line is drawn upwards upon a branch, from any particular leaf, the first leaf which lies in the course of that line will be found placed at the other extremity of the spiral.

A tree on which three leaves on the branch serve to complete the spiral, is termed *tripla;* one with four leaves *tetrapla;* and those on which five, six, or nine leaves are requisite for the purpose, are termed *pentapla*, *hexapla*, or *enniapla.*

In two species of Willow the leaves are placed opposite, and not in a spiral order. In another species, four leaves compleat the spiral upon the branch, and, on account of this singularity, it has been called

Salix *tetrapla.* All the other Willows, so far as has been observed, have their leaves disposed on the branches in a hexaplous order.

A new method of trees, founded on this order of their leaves, and assisted by other characters taken from their gems and leaves, was once projected, as subsidiary to their arrangement by the fructification. Many exotic trees continue long in European conservatories without displaying their flowers, and remain unknown and uncertain. By the assistance of such a method, their species might be sometimes ascertained without the aid of the fructification.

10. The buds or gems of the Willow are of three sorts.

1. Gemma foliosa, the leaf bud. This contains only the rudiment of a branch, with its leaves; for no gem, properly so called, is ever formed upon plants for the production of a single leaf.

2. Gemma florifera, the flower bud. This contains only the male or female catkin, without any leaves, except the foliola which compose the involucrum.

3. Gemma folioso-florifera, flower and leaf bud. This not only contains the male or female

catkin, with its involucrum, but likewise a number of leaves.

The Willows which have this last sort of gem are the following:

Salix *hermaphrodita, pentandra, alba, vitellina,* and *Egyptiaca,* Linn. and *polygamia,* N. These species distinguished by this character might form a very proper division in the genus, to be termed Pedunculis *foliosis;* while all the other species are Pedunculis *aphyllis.* All the species in this last division flower early in the spring, before the disclosure of the leaves; but those of the former not till summer is advanced, and when the leaves are fully disclosed.

In all the Willows, as in other deciduous trees, the leaves are only formed on the shoot of the present year. Some have the flower buds on the shoot of the former year, as the Osier and many others; but some have them on two years old wood.

11. The numerous and signal variations in the different parts of Willows, occasion great uncertainty in their species.

The leaves vary exceedingly in their form, even upon the same plant; the young and luxuriant being widely different from the older and stunted leaves.

In some, the leaves, when young, are entire on the margin; but when, old become denticulated or serrated.

In some, the young leaves are villous, but when older become quite glabrous.

In some, the young leaves are altogether glabrous; but in a more advanced state, they are covered with a velamen, which consists of a fine powder or farina. This farina is said, by Haller, to turn to a down as the leaves grow older; but this I have never observed. On the contrary, the down or villous cover subsists on the leaves of some species, and the velamen, or farinaceous cover upon those of others, but they appear not to be ever convertible into one another.

In some, the stipulae are only to be seen in a few of the very youngest leaves, but fall off, and disappear when the leaves have arrived at their full growth. Hence, the same species has sometimes been noted as having stipulae by one author, and as being destitute of them by another.

The stipulae are sometimes small and inconsiderable when the leaves are first disclosed, but alter in shape, and increase in size, as the season advances. This may have given rise to Haller's remark, that the stipulae are sometimes not to be seen at the young, but only at the old leaves; for I have never observed stipulae in any Willows, in which they could not be decerned at the young leaves.

The catkins also vary much in their shape at the different periods of their growth: the male catkins particularly, although oval before their florescence, become slender and cylindrical after they are blown.

12. All the Willows I have observed, have the foliatio equitans, except the *viminalis*, Linn. and four other species, which are marked by the vernatio revoluta.

13. The stipulae may be distinguished into the auriculatae and semiauriculatae. The first is in the form of an entire ear, with a curved circumference: the latter is, in figure, but one half of the former, having a streight margin on the interior, and a curved margin on the exterior side.

SEXES.

14. The Willows were thought by the ancients to produce no seeds; and it was easy for them, indeed, to fall into this deception.

The male trees produce no seeds, and even the female trees, when situated by themselves, which they must often be, are also infertile.

Theophrastus and Pliny supposed that the Willow did shed its seeds before they arrived at maturity; an idea which subsisted so early as the days of Homer, who gives the Willow the epithet of ὠλεσίκαρπος, or Frugiperda; and Aristotle* remarked that this tree was destitute both of fruit and seeds.

These notions might be also in some measure derived from the shedding of the pollen, which is thrown out in profusion by some of the Willows†, and by their minute and downy seeds being carried away by the winds. The easy and obvious propagation of these trees, by cuttings and layers, might likewise tend to indulge the opinion, that no other method of increase was necessary.

This opinion continued to be generally received till the time of Tragus and J. Bauhinus, who first undeceived the world, by asserting the Willows to be propagated from seed like other plants.

Bauhinus, in the year 1650, figured and particularly described the antherae of the Salix *helix*, Linn. 15.

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* Aristot. de An. Lib. I. cap. 18.

† We find in Pliny the following passage. "Salicis fructum ante maturitatem in *araneam* abire." But it should be *arenam* abire, for he plainly means the pollen flying in dust from the male catkins: But Pliny has had the misfortune to have his text more corrupted than that of any other ancient writer. Vid. Bauh. Hist. Tom. I. p. 211.

15. Scopoli* relates, that he had often observed female Willows fecundated by males which are accounted of a different species: an observation easily made, but its reality cannot be so easily ascertained and admitted.

USES.

16 Though the Willows afford no articles for sustenance, nor for any noted manufacture, they answer many useful purposes in rural economy and mechanical arts; among which are the following:

17. All the Willows, being naturally aquatics, as they spring freely from cuttings, and being of a quick and vigorous growth, they are the most proper plants for the embankments of rivers, for restraining their encroachments, and for preventing the hurtful effects of their inundations.

18. Though they are not so fit for fences as those trees and shrubs which are armed with spines and prickles, yet they are occasionally applied to this use, and may be peculiarly beneficial in deep wet soils, and especially wherever there is a ditch of stagnating water.

19. They

+ Scopoli Flor. Carniolica, p. 411.

19. They are used in France and Italy for supporting the vines, and in Germany and England as hop-poles.

20. Their very pliant twigs and their bark, when stripped off, are useful in gardens for tying trees to espaliers; for fastening scandent plants to arbours, and other purposes.

21. They are the most convenient article for binding faggots; and where tarred ropes of hemp are not to be had, they are the best material for sewing and fastening thatch on the roofs of houses.

22. In remote and unimproved countries, they are twisted by the inhabitants into ropes: I have rode in the Hebrides with a bridle made of them, and lain all night at anchor with a cable made of twisted Willows. In both instances, much industry and art were observable in this very rude manufacture.

23. The Willows which flower early, afford the most early and seasonable support to bees; without which, they sometimes would not be able to survive the spring.

24. As the foliage of all the Willows is wholesome and nutrimental to cattle, the leaves, upon their fal in autumn, are carefully collected, in some northern

countries, and dried for winter provender. When green, our cattle devour them greedily wherever they are within reach; and, in some places, the summer shoots of the Willows make a considerable article in the sustenance of the cattle late in autumn.

25. The bark and wood of the different species of Willow, afford the most acceptable food to the beaver in North America.

26. In the most remote northern countries, the inner bark of the Willows is even used for human sustenance, along with the inner bark of the fir and pine.

27. The fine white down contained in the seed vessels of all the Willows is a true cotton, which ingenuity may perhaps turn to some useful purpose. The separation of this cotton from its numberless small black seeds, is a difficulty which art may overcome. A greater inconveniency seems to be the shortness of its pile: Yet in some species it is much longer than in others; and was it once found to be useful, it might be obtained in very considerable quantities. It is not unlikely but this substance may have properties which might render it preferable to the West India cotton for some particular purposes.

28. No wood affords a sweeter fewel than that of the Willows. When sufficiently dry, it emits little smoke, and gives the clearest fire; but is apt to crackle very much when moist. It is the principal fewel in some parts of England, where the inhabitants are even confined pretty much to faggots formed of the mere lop from pollards.

This has not yet been practised in Scotland; but by the diminution of coal and peat, it may in time become necessary to have recourse to this relief.

29. The great utility of Willows for wicker work, is everywhere experienced, from the coarsest fabric, to that of the very finest texture. They supply agrestic operation with hurdles, panniers, and hampers; with all kinds of coarse basket work, and with all the finer sorts for domestic purposes.

30. The Osier is so valuable for hoops to casks, as to be marked by the name of the Hoop Willow, and is cultivated with care in the northern countries for herring barrels.

31. The Willow wood is generally light, soft, smooth, and easily susceptible of a fine polish. It is therefore chosen by the turner for platters, dishes, bowls, and various other utensils for a farmer's family; also for heels of shoes, and shoemakers lasts;

and, being very light and tough, for the ladders necessary about a farm.

32. From these qualities of the Willow timber, it was particularly chosen by the ancients, as Pliny informs us, for the fabrication of shields.

33. The softness and smoothness of the wood renders it peculiarly applicable as a cutting board for shoemakers, and as a board for whetting the fine steel instruments of cork-cutters and other mechanics.

34. The bark of some Willows is remarkably styptic: that of one species is employed in Swisserland in the tanning of leather. The bark of three other species has been successfully applied to the same use in Scotland; and the same quality may in some degree be expected in all the other sorts of Willows.

35. The same styptic quality of the Willow bark fits it for dyeing black, to which use it is applied in Swisserland and other countries.

36. The Willows, as almost every thing else, were viewed by the ancients as medicinal; and even by many of the moderns their medicinal properties have been extolled.

Their merit, however, has never been able to bring them into general practice; nor do their sensible qualities give ground to expect from them any remarkable powers as medicines.

In their leaves, and especially in their bark, they are generally, if not always, astringent. This quality having led some practitioners to make trial of the bark of Willows in intermitting fevers, they have spoken loudly of its effects, and probably not without some foundation. It is a property not to be considered as peculiar to this tribe of trees, nor even to the different sorts of Quinquina. A variety of barks seem in some degree to possess it, though we can scarcely expect to fall upon any that, for this purpose, will supersede the use of the Jesuits bark.

37. Though no one of the uses to which the Willow is applied, can be considered as of the first importance, yet they are upon the whole so numerous, and do so constantly occur in the rural, domestic, and mechanic employments of common life, that it is a tribe of plants which must be admitted to be eminently useful, and highly deserving of attention and culture.

38. The charcoal of Willow timber is not only serviceable, like that of other trees, for the furnace; but, being of a very soft and fine texture, is preferred by painters for the purpose of drawing, and also by

the manufacturers of gunpowder, as it is remarkable for taking fire readily.

CULTIVATION OF WILLOWS.

39. The cuttings may be planted at any time between the fall and springing of the leaf: but the time to be chosen is the beginning of February, when fewer of them fail to succeed than at any other season.

The best cuttings are taken from branches of two or three years growth, and should be about a foot long. When they are planted, it is of use to set them sidelong, and not perpendicularly, in the earth; for in the former position they put forth a greater number of roots.

The cuttings should be lodged full ten inches within the earth, and two or three eyes left above it: these will produce so many shoots; and if the plants are intended for trees, the principal shoot should be chosen, in the end of the season, and the rest cut off close by the stem.

40. The male and female Willow of the same species often differ remarkably from each other in their foliage. The leaves of the female, in the Salix

alba, Linn. are much larger, greener, and not so white, silvery, and pubescent, as those of the male.

This makes the difference in their aspect so great, that, when standing together, they might at first view be presumed to be different species.

But besides this, the female in most species are generally plants of a much more vigorous growth, of a larger size, and less brittle than the males. This is an important circumstance in the cultivation of Willows, though unknown and neglected by those who are employed in their culture. This difference in the growth of the male and female Willows evidently suggests the following rule:

That where a Willow is to be planted for its wood, the female ought to be chosen, being of a more luxuriant growth, and capable of forming a larger tree than the male. But if a willow is to be planted for fine basket work, the male must be chosen, for being of a less vigorous growth, it affords more slender and finer twigs than the female.

From the first rise of the herring fishery in Holland, the Osier or the Salix *vimenalis*, Linn. was cultivated as a plant of great moment, being the most proper for the hoops of herring barrels.

The Dutch boors without knowing any thing of the sexes of Willows, very sensibly selected the Osiers that were of the most vigorous growth, in consequence of which they propagated the female and rejected the male Osier.

All the plants of this species which we have in Scotland were originally from Holland, and they are almost all females, a male Osier being very seldom if ever to be seen.

41. The species of Willows from the south of Europe grow better with us in dry soils than any others, though they are still more vigorous in those which are moist. Such as, S. *vitellina*, *purpurea*, and *alba*, Linn. and S. *phloragna* and *amerina*, N.

42. The grounds cultivated with Willows in the south of England, or the Osier holts, as they are called, where Willows are cut annually for basket work, produce a crop that generally sells from ten to fifteen pounds the acre. This can afford a higher rent than the best lands can give in corn or grass, and it is peculiarly advantageous, as this high rent can be acquired from lands which are otherways of small value; from grounds liable to inundations, or from bogs and morasses, by the sides of lakes and rivers.

43. If Willows are allowed to grow for some years, their annual shoots become comparatively

short. To obtain those of a sufficient length for basket work, the Willows must be annually cut over close to the ground; and this ought to be done in autumn, immediately upon the fall of the leaf, and not delayed till spring or even till winter is advanced.

44. Though Willows in general grow most luxuriantly in watery places, or within the reach of water, there are some which thrive better than others on dry soils. Where it is wished to have Willows on such soils, the species to be chosen for basket work, for fences, or for trees, are, Salix *hermaphroditica*, *pentandra*, *vitellina* and *alba*, Linn. and *phloragna*, *amcrina*, *malifolia*, *concolor* and *nigra*, N.

Season of cutting the Willows.

45. In the culture of Willows for basket work, the question occurs, whether is it most proper to cut them in autumn or spring?

On this article two things are to be regarded: Which of the two seasons renders the Willows most pliant, tough and durable for wicker work? and which of the two tends most to promote the subsequent growth?

It has been a common practice to cut the Willows about the first of March, or sooner if the spring is early, before the sap runs.

They are then tied in bundles and placed on end in water, about a foot deep; there they continue till about the first of May, when they throw out their leaves, at which time, as the sap runs, they are taken out, peeled, and dried for use.

On the other hand, when Willows are cut in autumn, while they dry during winter, the soft extremities of the shoots shrivel and become unfit for use; whereas by standing through the winter, these tender extremities become firm and useful. But when it is necessary to cut Willows in autumn, which happens when they are exposed to cattle, they must then be boiled, which both facilitates their peeling, and hardens the tender part of the shoot, so as to render them useful.

The practice of cutting the Willows in autumn, has one great advantage over cutting in spring: the buds which are to afford the succeeding crop, are then immediately formed; they grow and strengthen during winter, and make earlier and stronger shoots in the following summer, than when the cutting is delayed till spring.

I. SALIX *hermaphroditica*, Linn.

S. FOLIIS serratis glabris, floribus hermaphroditis diandris. Linn. Sp. p. 1442. n. 1.
Scot. Black Clyde Willow.

DESCRIPTIO.

Arbor mediocris.—Rami annui rubri punctis albidis sparsis, autumno nigro-purpurei.—Folia oblonga acuta hexapla, glanduloso-serrata, lateribus et ad basin aequalia, glaberrima, subtus pallidiora.—Stipulae nullae.—Glandulae duae ad basin petioli utrinque.—Petioli rubri, ad basin folii glandulosi: glandulis stipitatis subramosis.

Amenta.—Seminifera matura semiuncialia sesquiuncialia ovata.—Squamae deciduae.—Capsulae sessiles ovatae acuminatae glabrae nitidae.—Pedunculus biuncialis foliosus, foliolis 5 vel 6.

Vernat 20 Aprilis locis montosis.

Place.—It was first pointed out, in September 1761, by Sir George Clerk, on the farm of Little Clyde, by the side of the road between Moffat and Leadhills, as a very particular species of Willow, which he had for many years observed at that place. It was afterwards found by the side of the Clyde in Crawford moor, at Black's Croft, about a mile from

Strathevon, on the Lismahago road, in Evondale, and at several other places in the upper Ward of Clydesdale. On the first September 1786, it was found with ripe catkins, near the east shore of Bute, and towards the south end of the island.

OBSERVATIONS.

1. It was preserved in the collection of Willows at Loudoun, by the name of the Black Clyde Willow. In autumn, the annual shoots become of a deep blackish purple colour, though this mark indeed does not correspond with the description of Linnaeus.

2. It is so greedily cropped by cattle, that in places exposed to them it is never suffered to grow up to a tree, but though for this reason its flowers have never occurred, there can be no doubt with respect to the species. A skilful Swedish botanist, on seeing the specimens knew them at once to be the Linnaean plant.

3. When this Willow was observed about the middle of September at Little Clyde, its leaves were covered with the Chrysomela *Populi*, Linn. When it was first found on the 5th of the same month in Bute, it was covered with great tuberous galls, placed on the branches, and at the base of the leaves.

These galls are probably formed by the Ichneumon *Cynipedis* of Linnaeus.

4. Though a quite different species, this plant has a great resemblance to the Salix *pentandra:* Its leaves, when they are young, have the same agreeable and peculiar smell, observable in those of the *pentandra.*

5. Its shoots are gross, and they will spring from a cutting, four or five feet in length, in one season. Its more luxuriant leaves are of a larger size than those of almost any other Willow.

6. It is a mountain Willow, even in our cold climate, and its growth is entirely concluded before the first of September.

II. SALIX *malifolia.*

S. FOLIIS ovatis, acuminatis, subtus tomentosis, margine undulato subintegro.

Salix (Caprea) foliis ovatis rugosis : subtus tomentosis, undatis, superne denticulatis. Linn. Sp. p. 1448. n. 28. Var. a. Fol. Lapp. n. 365. Tab. 8. fig. 8.

Salix Caprea, Hoffman. Hist. p. 25. Tab. 3. fig. 1. 2. Tab. 5. fig. 4.

Salix latifolia inferne hirsuta. Bauh. Hist. I. p. 215. fig.

Salix Caprea latifolia. Ger. em. p. 1390. fig. 4.

Salix Caprea rotundifolia. Tradescant. mus. p. 164.

Scot. Apple-leaved Willow.

Angl. Goat broad-leaved Sallow. Ger. round-leaved Sallow. Chesnut-leaved Willow.

Great Goats Willow, Tradescant.

DESCRIPTIO.

Arbor 30 pedum.—Rami annui et annotini virides glabri.—Folia novella utrinque villosa, versus basin ferruginea, marginibus revolutis.—Folia matura magna ovata acuminata, supra glabra, subtus albo-tomentosa, ad petiolum inaequalia, margine subintegro undulato.—Stipulae auriculatae acutae integrae.

Mas.---Amenta terminalia ovata, dum fumant ferè globosa.

Involucrum foliolis 5 lanceolatis integris villosis.

Squamae nigrae albo-villosae.—Stamina duo.—Antherae luteae.

Nectarium, Glandula cylindrica truncata, guttulam limpidam separans.

Foemina.—Germen pedicellatum villosum.—Stigmata duo bifida lutea.

Nectarium ut in mare.

Place.—It is frequent in our natural woods, and is often introduced into plantations. In the moun-

tain gullies of Annandale and Nithsdale, it is to be seen growing at a height from one thousand two hundred to one thousand five hundred feet above the level of the sea.

OBSERVATIONS.

1. Its leaf was first compared by Clusius to the leaf of the apple tree, to which it bears a very near resemblance: For this reason, it is generally known among our country people by the name of the apple-leaved Willow. The trivial name of *malifolia* is therefore applied to it, and that of *caprea* reserved for another plant, recorded as a variety by Linnaeus, but which is now well known to be a separate species.

2. This plant has been distinctly named, described, and figured by several botanists; but their names have been jumbled together by other botanists, with the *synonyma* which belong to the species we term the *caprea*.

3. It is apt to be thick and bushy when young, but it often grows up to be a stately tree, considerably above a foot in diameter. Its leaf is the largest of all our Willows, except that of the *hermaphroditica*.

4. It thrives better in a dry soil than almost any other Willow, and will grow luxuriantly from cuttings, even on the top of a dry bank.

Use.—When it grows up to be of a large size, and of sufficient age, it contains a great deal of red wood of an excellent quality. In some places, it is therefore called, though erroneously, the Red Saugh, for it is essentially different from the Salix *carnea.* It was pointed out by the Earl of Traquair, growing in his wood of Plora in Tweeddale, as the timber of which the farmers thereabouts made their best furniture.

Sir James Johnstone of Westerhall had a large dining table made from a tree of this species in Eskdale, which had afforded a plank of red wood sixteen inches broad; it was finely clouded, exactly of a mahogany colour, and scarcely to be distinguished by the eye from that wood.

The wood answers well for the shoe-makers cutting board, as it is every where of an equal softness, and preserves long the edge of the knives.

The charcoal of this fine Willow is remarkably smooth, and does most readily catch fire; it is therefore preferred to that of other trees in the manufacture of gun-powder.

It was observed by Linnaeus, in Lapland, that the bark of this tree was used by the inhabitants for tanning their leather. It is applied to the same purpose, by the country people, in several parts of Scotland, though the styptick property necessary for a tan, seems to reside in the bark of all the other Willows, and in that of most other trees.

In the art of drawing, it is also esteemed by painters above every other sort of charcoal.

The flowers of all the Willows are well known to be acceptable to bees: But there is no species of more importance than this, not only on account of the vast profusion of flowers it throws out, but the time of their appearance. It is in full flower between the 15th of March[*] and the 8th of April. During this time, whenever the thermometer is at, or about 42° in the shade, accompanied with sunshine, the bees come abroad. This is a temperature which often occurs; and if bees have an opportunity during that interval, of feeding three or four days upon this Willow, the hive will be preserved, when, without this, it would probably perish.

III.

III. SALIX *amnicola*.
Helix, Linn.

Salix *Helix* et *amnicola* characteribus sequentibus descrepant.

Helix, N. purpurea, Linn.	*amnicola*, N.
1. Arbor 20 pedalis, caudice ramisque erectis.	1. Frutex humilis, caulibus ramisque obliquis decumbentibus.
2. Rami annui praelongi amaene lutescentes.	2. Rami annui breviores purpurei.
3. Folia novella oposita.	3. Folia novella alterna.
4. Folia matura leviter serrata.	4. Fol. mat. insigniter serrata.
5. ———— supra dilute viridia, subtus pollidiora.	5. ———— supra saturate viridia, subtus glauco-coerulea.
6. Folia omnia saepe opposita, inferiora raro alterna.	6. Folia omnia saepe alterna inferiora interdum opposita.

Salix *Helix* et *amnicola* characteres sequentes habent communes.

Rami annui tenues glaberrimi tenacissimi.—Vernatio equitans.—Stipulae nullae—Folia novella glabra viridia, versus basin ferruginea.—Puncta duo infra basin petioli primum albida, postea ferruginea.—Folia matura oblongo-lanceolata, acuminata, glaberrima, serrata, serraturis glandulosis, versus basin et in ipso acumine integra. Flos monandrus.

OBSER-

OBSERVATIONS.

1. In a proper soil it will afford twigs from one to three feet longer than those of the *amnicola ;* though they were alike in all other things, which gives it a decided preference as a basket-Willow.

2. In consequence of its southern extraction, it retains its leaf with us much longer than the Helix.

Use.—This low shrub is rarely to be found at a distance from running water. The situation it delights in, is the very brink of a brook or a river, especially where they run upon gravel.

This is its noted residence, and, on that account, it, peculiarly, is called by our country people, the Water-Willow. Its natural situation points out one remarkable use to which it may be applied. Of all its kind, it is the best plant for defending and strengthening the banks of rivers. Some Willows are of a growth too diminutive and straggling for this purpose; others are of a growth too large, and form themselves into separate and distinct trunks; but this Water-Willow soon fills the brink of a river with its extensive matted roots, which scarce any current can displace. It shoots not to any great height, but spreads its numerous branches and twigs rather in a horizontal direction: Its inclination is to extend them over the water, where they hang down to its surface; and there they interrupt the sand, mud, and rubbish that come down. In this way, they not only prevent any encroachment on the brink where they were planted, but in time they encroach upon the river, and make it recoil from the bank by the deposition of its own sediment.

IV. SALIX *Triandra.*

S. FOLIIS glabris oblongis acutis serraturis glandulosis, petiolis glandulosis, stipulis curvato-lanceolatis.

Salix Triandra. Hoffmann. Hist. p. 45. Tab. 9. 10?

DESCRIPTIO.

Frutex humani altitudinis.---**Rami** annui laeves subrubri nitentes punctis adspersi, flexiles.---**Folia** biuncialia oblonga acuta glabra, lateribus subaequalibus, serrata, serraturis glandulosis, supra viridia nitida, subtus pallida.---**Petiolus** brevis ruber, glandulis pedicellatis distichis ad basin folii.---**Stipulae** curvato-lanceolatae serrulatae: serraturis glandulosis.

Foemina.---**Amentum** foemineum unciale.---**Capsulae** laxae ovatae acuminatae, glaberrimae nitidae luteo-virides.---

Squamae deciduae.---Pedunculus amento longior, foliaceus.

Place.—It grows in the coppices by the side of the river Black Esk, in Eskdale; in Stitherick Wood, in Annandale; by the side of a stagnating pool near the Clyde, a little above the house of Newton, in Crawford Moor.

OBSERVATIONS.

1. As no opportunity has offered of examining the flower of this Willow, it is mentioned here as a very dubious plant, and, perhaps, not different from the *Pentandra.*

2. When the specimens of it were shown to Mr Afzelius, he said it was the true *Triandra* of Linnaeus.

3. Hoffman's figures, here quoted, exactly represent this plant, though most of his synonyms certainly belong to the *Phloragna:* and his long description seems sometimes to refer to the one plant, and sometimes to the other.

4. Though this Willow grows in the same parts of the country with the *Pentandra,* it never rises to a tree: It flowers when but three or four feet high:

Its leaves are smaller, narrower, and more acute than those of the *Pentandra*, and have not the peculiar smell. All these doubts, however, may be determined by an examination of the flower. It is not unlikely but that these may be two triandrous Willows.

5. The seed vessels were found just beginning to burst on the 25th of September.

V. SALIX *argentea.*

S. FOLIIS integerrimis sessilibus obovatis eglandulis utrinque tomentosis, apicibus oblique reflexis, stipulis pedicellatis.

Salix pumila foliis utrinque candicantibus et lanuginosis. Raj. syn. p. 447. n. 3. tab. 19. fig. 3.

DESCRIPTIO.

Frutex bipedalis quatuor pedalis procumbens. **Rami** annui et annotini teretes tomentosi albidi. **Folia** sessilia integerrima obovata acuta crassa, sursum secunda, eglandula utrinque tomentosa, argentea, sciz. albo cum splendore praedita. Apices foliorum ita oblique reflexi sunt, ut quasi emarginati appareant. **Stipulae** pedicellatae ovatae acutae integrae.

Mas—Amenta alterna, interdum ramulis supremis opposita. Squamae lutescentes.—Antherae luteae.

Place—It grows on the sandy shores of the Rins of Galloway, and of West Ross; also in the plantations on the Sandy shore at Tyningham in East Lothian; and there, as in other places, appears altogether as a maritime plant.

OBSERVATIONS.

1. This is the Willow that grows near Sandwich in Kent. It is probably meant by several writers; yet the above name of Ray is the only one that with Certainty can be applied to it, though the figure in the Synopsis is far from being satisfactory.

2. The character of *argenteum* properly applied by Ray, to the leaf, is here retained as the trivial name. The leaves are of a more silvery white than those of any other Willow, and when carefully dried this character still remains very striking to the eye.

3. In a garden it flowers on the 22d of April, before the vernation of the whole plant, and when only two or three of the early terminating gems have budded.

4. When the leaves fall in autumn, they are exceedingly white, but only of a dead white, having lost their lustre. On the ground they soon become of a fuliginous colour.

5. It retains its leaf in autumn much longer than the *hebridiana*, and is sometimes not defoliated till the 1st of December.

6. In a garden it is of an upright growth, and in a few years arrives at the height of five or six feet. The *hebridiana* kept in the same ground is never of this stature but remains always low.

VI. SALIX *amerina.*

Brit. Amerine Willow. Poplar Willow. Cane Willow.

DESCRIPTIO.

Arbor triginta pedum—Truncus et brachia cinereo-alba glabra nitida—Rami annui rubro-virides: annotini albidi glabri nitidi. Folia novella glaberrima bicoloria, sciz. viridia, versus basin ferruginea. Folia matura lanceolata glaberrima, amoene viridia, subtus pallidiora, serrata; serraturis glandulosis

losis. Ad ipsum apicem et basin serrata. Stipulae uniauritae ovatae acutae persistentes, serraturis glandulosis, caducae. Hybernaculum gemmae foliosae, e squamis tribus constat: una interiore; duabus exterioribus inaequalibus.

Mas. **Amenta tenuia lutescentia, medio rami annotini posita. Squamae lutescentes albo-ciliatae. Stamina duo. Antherae luteae. E surculo, amenta producit anno quarto.**

Place.—Brought originally from England or from abroad, but long cultivated in Scotland as a basket Willow. It is probably a native of the east, and perhaps of the southern parts of Europe.

OBSERVATIONS.

1. It is distinguishable from all the Willows by its white smooth burnished bark, which is exactly like that of the black poplar, and from which it has generally obtained the name of the poplar Willow. For the same reason it is called the cane Willow by others.

2. It may be the Salix *candida* of Theophrastus, but with greater probability it may be presumed to be the Salix *amerina* of Pliny, who applies to it the name of Candidior, evidently from the whiteness of its bark. It seems also to be the Salix *amerina*

of Dalechampius, well known in the vineyards in the eastern parts of Europe, and also in France, where it is introduced for supporting the vines.

3. It grows in great abundance, and with great appearance of being a native, upon the river of Eden at Mellerstain in the Merse; but has undoubtedly been introduced, along with many other exotic trees, in the plantations about that fine place. One tree of this sort, upon the river below the house, was measured in September 1795, and found to be four feet ten inches in circumference, four feet above the ground, and thirty feet high.

4. Like the other Willows of a southern climate, its growth is continued late in autumn, till it is interrupted by the frost.

Use—It is reckoned in some places the best basket Willow, and is more frequently cultivated than any other for white wicker work. It grows freely and luxuriantly even in a dry soil. When cut over, it affords during the season, numerous shoots, especially towards the extremity, of a red colour, but towards the base of a greenish white, and the whole become remarkably white in winter.

Its bright green foliage, and its white bark, render it one of the most pleasing trees to the eye. It is

therefore remarkably adapted for ornamenting any marshy grounds, or the sides of lakes.

VII. SALIX *phloragna*.

S. FOLIIS glaberrimis lanceolatis, serraturis glandulosis, stipulis uni-auritis ovatis, floribus triandris.

Salix folio amygdalino utrinque aurito, corticem abjiciens. Raj. syn. 2. p. 292. n. 6.—Ed. 3. p. 448. n. 10.

Salix foliis eliptico-lanceolatis, utrinque glabris serratis appendiculatis. Gmelin. Flor. Siber. tom. 1. p. 155. tab. 34, fig. 3.

Salix (auriculata) foliis serratis glabris lanceolatis omnibus alternis. Miller. Dict. n. 9.

Salix foliis glabris, eliptico-lanceolatis, serratis, stipulis dentatis, julis gracilibus, triandris. Haller Hist. n. 1637.

Brought to Scotland from different parts of England and Ireland, by the names of the Goldstone Willow, Irish Willow, Brown Rod, and Spanish Willow.

DESCRIPTIO.

Arbor mediocris.—Rami annui angulati virides glaberrimi. Folia novella unicoloria viridia glaberrima. Folia matura lanceolata glaberrima serrulata, serraturis glandulosis, supra viridia, subtus pallidiora. Stipulae uni-auritae strictae latae ovatae acutae persistentes, margine glanduloso.

Mas—Amenta mascula pluria versus apicem ramulorum, post vernationem erumpentia. Gemmae foliiferae ad basin gemmarum amentiferarum erumpunt.

Amentum sesquiunciale cylindricum album. Involucrum tetraphyllum, foliolis ovato-lanceolatis integris stipulaceis persistentibus, ad basin exterius villosis. Squamae ovatae obtusae concavae albae. Stamina tria. Antherae luteae.

Foemina—Amenta foeminea post vernationem erumpunt. Amentum sesqui-unciale cylindricum tenue. Involucrum tetraphyllum, foliolis stipulaceis, persistentibus, foliis arboris prorsus similibus. Squamae ovatae obtusae rugosae albo-virides glabrae muticae. Stigmata duo bifida. Ad basin gemmae amentiferae, una v. altera gemma foliacea serotina erumpit.

OBSERVATIONS.

1. Though this Willow has three stamina, it appears to be a different species from the *triandra* of Linnaeus. He quotes indeed the above name and figure of Gmelin, which evidently belong to this plant, but still there is reason to suppose, that the *triandra* meant by Linnaeus is a different species, or at least, that there is another triandrous Willow.

2. It has no appearance of being a mountain or Alpine Willow. It may grow in Siberia, but it grows also upon the Rhone. It looks like a native of the southern parts of Europe, and though probably not indigenous, has been long cultivated in England.—

Like the other southern Willows, its shoots continue growing till after the 15th of September, and even till they are cut down by the frost. It is of a strong and vigorous growth, and rises up in a few years to be a tree twenty feet high. At Newhales in Mid-Lothian, it has been seen to throw up a shoot ten feet long in one season.

3. There is one property in this Willow, by which it is distinguished from all others. When it grows up to a tree, or even when but little thicker than a man's wrist, it annually bursts, and throws off the epidermis and outer bark, leaving the inner bark exposed, of a yellowish brown colour. From this remarkable property, the trivial name of Phloragna is taken, composed of φλόις cortex, and ῥήγνυμι rumpo.

4. In September, when the bark is separated from the two year old shoots, it is of a bright yellow colour on the inside.

5. The seeds begin to fly in the first week of September.

6. It retains its leaf longer than any other Willow we have; and is sometimes not compleatly defoliated till the 10th of December.

VIII.

VIII. SALIX *rubra*.

S. FOLIIS ovatis acuminatis glabris glanduloso-crenatis, margine undulato, stipulis uni-auritis.

Scot. The Red Saugh.

DESCRIPTIO.

Arbor 40 pedum. Folia ovata, apice acutiusculo, sciz. acumine brevissimo, serrato-crenata, basi inaequalia, leviter tomentosa, margo foliorum undulatus, apex interdum obtusiusculus. Rami annui pubescentes subrubri; annotini lutescentes glabri. Folia novella basi ferruginea. Vernatio revoluta, stipulae uni-auritae ovatae acutae persistentes, margine glanduloso.

Mas.—Amentum ovatum ante explicationem rufum. Antherae ante fumationem rubrae, postae luteae. Fumat 1 Maji. Involucrum sex foliolis inaequalibus ciliatis. Squamae fusice villosae. Nectarium, glandula cylindrica minima truncata, guttulam limpidam separans. Antherae duae.

Foemina—Amentum et nectarium ut in mare. Germen pedicellatum villosum. Stigmata duo bifida.

Place—This Willow was first observed in the year 1758, at Woodhouselee, near Edinburgh. Plants of it are still to be seen in the remains of the natural woods in the parishes of Lasswade and Collington. It is frequent also in the woods of Annandale, Nithsdale, and many other places.

OBSERVATIONS.

1. Though this species has not perhaps escaped the observation of many botanists, yet it is no where found so clearly delineated, as to authorise the certain application of any synonyma.

2. The young luxuriant shoots from the root, have very large persistent stipulae.

3. The wood of this tree is remarkably red, but so likewise is the wood of the Salix *malifolia* and *caprea*, when they grow up to be aged trees. Each of these is therefore called sometimes the red saugh by our country people, who cannot be supposed to be very expert in distinguishing the species of Willows. The name of red saugh, however, is more generally and properly applied by them to this species than to any other. Not merely on account of the redness of its wood, but because its inner bark and alburnum are of a beautiful flesh-red colour, an appearance not observable in any other species. This peculiar colour,

lour is very striking to the eye, when the tree is cut, and is the reason why it has very properly obtained the name of red saugh.

4. When trees of this species are cut down in the woods at Elliock in Nithsdale, and in the wood of Cragieburn in Annandale, their trunks are often found perforated by a large caterpillar, but to what insect it belongs is uncertain. It is probably some large cerambyx, and perhaps the *moschatus* of Linnaeus, or possibly the Phalaena *Cossus* of that author, though neither of these insects in their winged state have yet been observed in that part of the country.

This caterpillar enters the trunk at the ground, and eats its way upwards. It makes a cylindrical perforation in the wood, near half an inch diameter, and from six inches to a foot long. This perforation is often in the red wood of the tree, and full of the foeces of the animal. There are sometimes six or eight of these perforations in one tree.

Use.—The wood of this tree, with respect to colour, hardness, toughness, and durability, is preferable to that of any other Willow in this country. It remains longer entire under water, and even under alternate wetness and dryness than any other wood we have. For these properties it is much valued, and sells at a higher price for those parts of mill machinery that are exposed to wetness.

IX. SALIX *rubigo*.

6. FOLIIS crenatis ovatis acutis exstipulaceis, utrinque villosis sericeis, crenis glandulosis.

DESCRIPTIO.

Caules bipedales quinquepedales virgati divergentes patuli graciles nudi. Rami annui tomentosi, annotini glabri. Folia sessilia ovata acuta, utrinque villosa sericea, leviter crenata, sciz. crenis duabus tribusve, cum glandula villis immersa. Stipulae nullae.

Foeminea—Amenta extremitatibus ramulorum, masculo absente, abortiva cadunt.

ARGENTEA.	RUBIGO.
α. Caules firmi crassi.	α. Divergentes patuli graciles.
β. Rami annotini tomentosi.	β. ———— ———— glabri.
γ. Folia obovata integerrima eglandula.	γ. Ovata leviter crenata glandulosa.
δ. Stipulae ovatae acutae integrae.	δ. Exstipulata.

Place—First found anno 1795, by Mr. Arthur Bruce in the head of Teviotdale, at a great height above the sea, in a bog upon the estate of Mr Douglas of Cavers.

OBSER-

OBSERVATIONS.

1. From the place in which it was found, and from its appearance in the garden, it seems to be an Alpine plant.

2. It is remarkably villous on both sides of the leaf. Yet in spring and the beginning of summer, they are quite green. As autumn approaches they assume a very white colour, and appear as if they were covered with a white mildew. From this circumstance, the trivial name of Rubigo is adopted.

X. SALIX *lapponum*, Linn.

S. FOLIIS integris eglandulis ovatis acutis laevibus utrinque tomentosis.

Salix Lapponum foliis integerrimis hirsutis lanceolatis. Linn. Sp. p. 1447. n. 22.

DESCRIPTIO.

Frutex erectus pedalis tripedalis, ramis vetustioribus fuscis contortis tuberculosis.—Amentum foemineum maturum ovatum semiunciale crassiusculum villosissimum.

Salix *Lapponum* et *Halleri* characteres sequentes habent communes.

Rami annui breves crassiusculi.—Vernatio equitans.—Stipulae minimae caducae.—Folia integra eglandula ovata acuta.—Puncta duo ferruginea infra basin petioli.

Place.—It was first observed in July 1762, among the rocks on the north side of the mountain, which lies south from the foot of Loch-Skene, in the parish of Moffat. Its situation, at that place, is more than two thousand feet above the sea; and it is exactly the same with the Lapland plant received from Dr Solander.—It was afterwards found in June 1771, on the mountain of Ben-na-Cailleach in Breadalbane, especially by the sides of the brook which runs down from near the top of the mountain towards Finlarig.

OBSERVATIONS.

1. It is rather a tomentum than villi that covers both sides of the leaf.

2. Kept for many years in a moist shaded situation in a garden, its natural appearance has been less altered than that of any other alpine Willow in a cultivated state.

XI. SALIX *Halleri.*

S. FOLIIS integris eglandulis, ovatis acutis rugosis, supra glabris, subtus tomentosis.

Salix foliis integerrimis, ovatis lanceolatis, subtus sericeis, julis tomentosis. Haller. Hist. vol. ii. p. 307. n. 1642.

DESCRIPTIO.

Salix *Lapponum* et *Halleri* characteribus sequentibus discrepant.

LAPPONUM.	HALLERI.
1. *Rami annui* tomentosi albi.	1. Glabri virides.
2. *Folia novella* utrinque tomentosa unicoloria alba.	2. Supra viridia glabra, subtus tomentosa albida, basi ferruginea.
3. *Stipulae* acutae.	3. Ovatae obtusae.
4. *Folia matura* laevia supra albida, subtus alba, utrinque tomentosa.	4. Rugosa, supra saturate viridia glabra, subtus viridi-albida tomentosa.
5. *Folia*, tactu mollia.	5. Scabra.

Place.—This Willow was sent about the year 1770 from Swisserland, along with other alpine plants, to the late Sir James Nasmyth. It has

been kept, for many years, in the same garden with *lapponum*; but the different characters of the two plants, as marked here in their names and descriptions, continue always the same.

OBSERVATIONS.

1. It is a shrub of a larger growth than *lapponum*; and its leaves, though of the same shape, are much larger, and more thinly set on the branches.

2. The leaves though wrinkled are glabrous, and of a dark green on the upper side, and on the under side of a whitish green. But the leaves of *lapponum* are, on both sides, and at all times, very white and tomentous.—These distinctions render the general aspect of the two plants widely different.

3. It is considered, both by Linnaeus and Haller, as the *lapponum*, Linn.; but it appears evidently by long cultivation, to be a distinct plant. Gmelin's name and figure quoted by Haller, do not belong to it.

XII.

XII. SALIX *Americana.*

S. FOLIIS serratis utrinque glabris lanceolatis: serraturis glandulosis, stipulis minimis ovatis acutis.

DESCRIPTIO.

Frutex humilior.—Rami annui glabri virides graciles lentissimi; annotini purpurei.—Vernatio equitans.—Folia novella unicoloria, scil. albido-sericea.—Stipulae minimae ovatae acutae caducae.—Petioli elongati.—Folia matura exstipulacea lanceolata elongata, utrinque glabra, supra dilutè viridia, subtus pallidiora, margine recto serrulato: serraturis glandulosis.—Folia ad apicem et ad basin serrulata sunt.

Place.—It was brought from America by Lord Loudon; but no name of any author has occurred, that with certainty can be applied to it.

OBSERVATIONS.

1. Its annual shoots are from two to three feet in length. They are very slender, of a very equal thickness, and extremely tough. They can be wound round the finger, or tied with a knot like a cord. It promises, therefore, upon cultivation, to be the

most eligible plant, perhaps of the whole genus, for fine basket work.

2. The stipulae fall off so soon, that they can only be observed at three or four of the youngest leaves.

XIII. SALIX *concolor*.

S. FOLIIS undulatis glabris oblongis acuminatis crenatis: crenis glandulosis, paginis concoloribus.

DESCRIPTIO.

Statura arborea.—Rami annui glabri rubro-virides: annotini fusco-purpurei.—Vernatio equitans.—Folia *novella* glabra unicoloria viridia.—Stipulae latae uniauritae acutae persistentes, serratae: serraturis glandulosis.—Petioli elongati rubro-virides.—Folia *matura* oblonga acuminata diaphana, utrinque glabra concoloria, margine undulato crenato, cum glandula in crena. Folia ipso acumine, et ad basin integra.

Place.—It was found in the collection of Willows at Loudon; but it did not appear with certainty, from what country it had been brought.

OBSERVATIONS.

1. No name, description, or figure of this plant, has as yet been discovered in any writer. It appears not in our catalogues of European Willows, and has perhaps been brought from America.

2. It approaches nearest, in its habits and characters, to the *Caprea, N.*; but is a species quite distinct, and of a larger growth.

3. Of all the Willows, the upper and under side of the leaf, in this species, do most resemble each other in colour, being nearly of the same shade of green.

Use.—Few Willows give stronger shoots, or of a greater length. It affords from the root rods five or six feet long, which are well adapted for basket work. If permitted to grow for two or three years, they are equal if not superior, for hoops, to those afforded by the *vimenalis*. It is as hardy as any of the native Willows, and receives no injury from our winters.

XIV. SALIX *aequivoca*.

S. foliis integris oblongis acutis, glandulis marginalibus, stipulis uniauritis ovatis acutis.

DESCRIPTIO.

Statura arborea.—Rami annui rubricantes tomentosi: annotini purpureo-nigri.—Vernatio revoluta.—Folia *novella* albida leviter pilosa, basi ferruginea.—Stipulae parvae uniauritae ovatae acutae persistentes, margine glanduloso.—Folia *matura* hexapla integra oblonga acuta, margine glandulis adsperso at vix serrato, supra glabra, subtus albido-tomentosa.—Ramuli aestivi foliis obovatis obtusiusculis.

Place.—It was found among the Willows at Loudon Castle; but it was not known from whence it had been brought; nor does it appear with certainty in any author.

OBSERVATION.

1. It grows well, and gives a strong shoot, three or four feet long, even in a dry soil.

XV.

XV. SALIX *ligustrifolia.*

S. FOLIIS integris eglandulis linearibus acuminatis exstipulaceis.

Salix *fissa*, foliis integris, oblongo-lanceolatis, acuminatis glabris. Hoffmann. Hist. p. 61. Tab. 13 et 14.

Salix *tristis*, exstipulacea, foliis lineari-lanceolatis petiolatis rugosis subtus tomentosis. Hort. Kew. vol. iii. p. 393. n. 24? Lumnitzer. Flor. Poson. p. 443. n. 976.

DESCRIPTIO.

Frutex debilis vix humani altitudinis.—Rami annui graciles filiformes virides glabri: annotini fusci.—Vernatio equitans.—Folia *novella* unicoloria viridia glabriuscula.—Stipulae nullae.—Folia *matura* linearia acuminata, integra eglandula, supra saturate viridia glabra, subtus albida minutissimè pilosa.—Punctum rubrum unum alterumve, infra basin petioli.—Gemmae in axillis foliorum rubrae.

Place.—It seems to be a native of the midland and southern parts of Europe. Along with other live Willows, two plants of this species were sent me by Professor Thunberg, anno 1788, from the Upsal garden, but without any name, and both turned out to be females.

OBSERVATION.

1. It may possibly be the plant that has been considered by some foreign botanists, as the *rosmarinifolia.* The margins of the leaves are not, however, in the least reflected. Of all the Willows it most resembles in its foliage the Ligustrum *vulgare*, Linn.

XVI. SALIX *myrsinites.*

S. FOLIIS crenatis glabris ovatis acutis venosis, stipulis ovatis acuminatis, crenis glandulosis.

Salix Myrsinites, foliis serratis glabris ovatis venosis. Linn. Sp. p. 1445. n. 13. Flor. Lapp. p. 285. n. 353. Tab. 7. fig. 6. Tab. 8. fig. f.

Salix Myrsinites. foliis serratis glabris, ovatis, subdiaphanis. Hoffmann. Hist. p. 71. Tab. 17. fig. 1. 2. Tab. 18. fig. 1. 2. Tab. 19. Tab. 24. fig. 2.

DESCRIPTIO.

Frutex semipedalis, bipedalis, erectus.—Rami annui fusco-virides glaberrimi.—Folia *novella* basi ferruginea.—Vernatio equitans.—Stipulae parvae ovatae acuminatae denticulatae caducae.—Folia *matura* crenata crenis glandulosis, ovata acuta venosa glabra dilute viridia nitida diaphana.—Venae undecim

circiter, peripheriam folii attingunt, supra concavae, subtus convexae, subparallelae.—Folia ad apicem et ad basin crenata; lateribus basi inaequalibus.—Amentum masculinum ovatum villosum, ante fumationem glauco-purpurascens.—Foliola quatuor in pedunculo oblonga integra caduca.—Antherae luteae.

Venae foliorum faciem quasi lineatam dant.

Place.—This rare species was found in September 1774, on the high mountainous farm of Eochan, upon the estate of Lord Elliock, in the head of Nithsdale: nor does it appear to have been observed any where else in Scotland. It grows there upon a heathy soil, about one thousand six hundred feet above the level of the sea, and with a very dwarfish appearance. Brought into the garden, however, it it grows freely to the height of five or six feet, with much larger leaves, but still retains its peculiar characters.

OBSERVATIONS.

1. In the garden it fumes on the 20th of May. Its vegetation, like that of the other alpine Willows, is concluded before the end of August, but it retains its leaves longer than most others. It was still in leaf on the 16th of November.

2. The colour of the male catkins, before the stamina are disclosed, is singular. It is termed *coerulescens*

lescens by Linnaeus[*]; but it rather appeared as a mixed shade of the glaucous and purple colours.

3. Linnaeus[†] describes it indeed as being without stipulae. But these appendages in the alpine Willows are generally very perishable, and are only to be observed in the early or in the recent shoots. His figures in the Flora Lapponica, though made, it is probable, only from dried specimens, are very characteristic and satisfactory, though greatly inferior indeed to the admirable figures of Hoffman.

XVII. SALIX *retusa*.

S. FOLIIS serratis glaberrimis obovatis obtusissimis, serraturis glandulosis, stipulis ovatis acutis.

Salix *retusa*, foliis subserratis glabris obovatis obtusissimis. Linn. Sp. p. 1445. n. 15.

DESCRIPTIO.

Frutex semipedalis vix pedalis, ramis procumbentibus.—Rami annui breves crassiusculi virides glabri.—Vernatio equitans.

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[*] Flor. Lapp. p. 285.

[†] Flor. Suec. p. 348.

tata.—Gemma foliacea univalvis, valva per rupturam apice bifida.—Folia serrata glaberrima obovata obtusissima, (presertim primordialia) viridia nitida subtus pallidiora, serraturis glandulosis.—Petiolus brevissimus longitudine stipulae.—Folia ad apicem et ad basin serrata: lateribus ad basin aequalibus.—Stipulae ovatae acutae denticulatae parvae.—Amentum femineum, in horto, magnum, pro mole plantae crassum ferrugineum.

Place.—It grows on Ben Lawers, and other neighbouring mountains in Perthshire, at a great height, and near their summits.

OBSERVATIONS.

1. Linnaeus in a subsequent observation, describes the leaves with parallel veins. This appearance, which is to be seen chiefly on the under side of the leaf, is not so remarkable as in *myrsinites*, and scarcely more in our plant than in many other species.

2. Some of the leaves are acute, but most of them are remarkably obtuse; and when obtuse, have sometimes a small notch at the extremity. The leaf upon the whole, is more obtuse than in any other Willow belonging to this division of the genus.

3. The upper side of the leaf, especially when young, viewed with a moderate magnifying glass, appears covered with minute white points.

4. In a garden, its spring growth is finished before the 20th of June, and its summer growth before the 20th of August, dropping its leaves very early in autumn. But these circumstances, indeed, do in general take place in all the alpine Willows.

5. It appears probable, but not certain, that this is the *retusa* of Linnaeus. At least, Haller's name, which he quotes, seems to belong to a plant different from that which is here described.

XVIII. SALIX *vacciniifolia*.

S. FOLIIS serratis glabris, serraturis glandulosis, stipulis ovatis obtusis convexis integris.

Salix Alpina, alni rotundo folio, repens. Boccon. Mus. pars 2. tab. 1?

DESCRIPTIO.

Frutex decumbens, ramis prostratis radicantibus. Rami annui virides glabri. Vernatio equitans. Folia novella glabra bicoloria, scil. viridia basi ferruginea. Stipulae parvae ovatae obtusae integrae convexae strictae : margine interiore glandulis albis obsito, omnino ut in S. *lucida*. Folia matura ovata acuta glabra serrata ; serraturis glándula spherica lutea terminatis, supra viridia, subtus pallidiora.

Place—Found in July 1762 on the east side of the high mountain of White-Coom-Edge, in the head of Annandale. It grows there, more than 400 feet above the place where the S. *lapponum* grows on the same mountain. It is therefore a true alpine Willow, and yet I found it since in wet moorish grounds, upon the estate of Cluny in Fife, not six hundred feet above the sea.

OBSERVATIONS.

1. It is probable that this Willow is meant in the names of several botanists ; yet none of these names can with sufficient certainty be applied to it.

2. The glands on the margin of the leaf, especially early in summer, are of a pretty bright yellow colour.

3. Of all the Willows, it most resembles in its foliage, the Vaccinium *Myrtillus*. Linn.

XIX. SALIX *lucida*.

S. foliis crenatis glaberrimis ovatis acutis, crenis glandulosis, stipulis ovatis intus glandulosis.

Salix Alpina pumila, repens, retuso Serpyllifolio lucido. Boccon. Mus. pars. 2. p. 19. tab. 1 ?

DESCRIPTIO.

Frutex humilis, ramis prostratis radicantibus. Rami annui rubro-virides glabri. Vernatio equitans. Folia novella unicoloria viridia glaberrima. Stipulae parvae ovatae obtusae integrae convexae strictae, superficie et margine interiori glandulis albis obsito. Omnino ut in S. *vacciniifolia*. Folia matura ovata acuta glaberrima crenata, crenis glandulosis, supra saturate viridia lucida, subtus pallidiora. Margo folii prope basin integer, sed ad ipsum apicem glandulosus. Amenta foeminea tenuia cylindrica, at sine mare infertilia.

Place—This, with other live Willows was brought from the King's garden at Copenhagen, by the late Mr James Wright, surgeon, who, much to the loss of his friends and of natural history, fell by a premature death in the East Indies.

OBSERVATIONS.

1. Its native country and situation are unknown. From its progress for several years in a garden, it has all the appearance of an Alpine Willow, and is probably a native of the southern parts of Europe. It may possibly be the plant meant by Boccone in the above synonym.

2. Of all the Willows, this has the most shining leaf. Its leaves in a garden must be large, compared to what they may be in an alpine station. Though less in size, they exactly resemble those of the Pyracantha, in their shape, colour, and shining surface.

3. The stipulae are of a very singular structure; their concave or inner side next the stem being covered with white glands. The outermost row of these glands forms what appears to the naked eye a white line on the interior margin of the stipula. A character not yet observed in any other Willow except the *vacciniifolia*.

XX. SALIX, *Evoniae.*

S. FOLIIS glabris obovatis, serraturis glandulosis subtus glaucis exstipulaceis.

Salix pumila, foliis ovalibus, obscure serratis, utrinque lævibus, inferne glaucis. Gmelin, Flor. Sib. tom. 1. p. 159. t. 35. p?

The Evon Willow.

DESCRIPTIO.

Frutex pedalis bipedalis, decumbens, ramosissimus, ramis brevibus.

Rami annui teretes subrubri, annotini lutescentes folia obovata, obtusa serrata, serraturis glandulosis supra viridia, glabra, subtus glauca, non autem villosa. Latera folii aequalia. Nerva media rubescens, glandulae duae minutissimae, loco stipularum folia interdum acuta praesertim ramis floriferis.

Mas—Amentum semiunciale subterminale. Involucrum triphyllum, foliolis inaequalibus, lanceolatis, margine piloso serrulato. Nectarium bifidum. Stamina duo, antherae luteae.

Foemina—Amentum sesquiunciale subterminale. Involucrum triphyllum, foliolis inaequalibus, lanceolatis. Squamae calycinae, nigrae villosae, nectarium glandula cylindracea minima, truncata, in axilla capsulae—capsulae laxae villosae.

Place—It grows in many places upon the river Evon, in the head of Annandale, and particularly below Evon bridge, on the road from Moffat to Dumfries. Also near Strathevon in Clydesdale.

OBSERVATIONS.

1. The above name of Gmelin is applied to this plant; not from a certainty of its being exactly the same, but because both his description and figure approach nearer to the plant which is here meant, than any other Willow that is recorded.

2. Along with the above plant, Gmelin figures another specimen tom. 1. tab. 35 figure A, without fructification, which he supposes to belong to the same species. The foliage in this figure exactly resembles that of our plant.

3. In its native situation, it is often under one, and seldom above two feet high, being much cropped by the cattle. When planted in a rich moist soil it rose in five years to the height of a man. It does not vernate or bud till about the beginning of May.

4. The underside of the leaves is of a whitish, glaucous colour, but not in the smallest degree villous or tomentous. This glaucous colour is owing to a fine

velamen or pollen which is easily rubbed off by the finger, and then the leaf appears quite green.

5. Though essentially different, it approaches in some of its characters to the *arbuscula* of Linn. In its aspect, it resembles most our common grey saugh, or Salix *grisea*, with which it is sometimes intermixed; but differs from that species, in being of a more diminutive size, and in having leaves quite glabrous and destitute of stipulae.

Use—Its yellow twigs being extremely tough and slender, if they were brought by cultivation to be of sufficient length, they would exceed most Willows for making fine basket work.

XXI. SALIX *glauca*, Linn.

S. FOLIIS integerrimis, subtus tenuissime villosis ovato-oblongis. Linn. sp. p. 1446. n. 19.

S. foliis integris subtus tenuissime villosis ovatis. Linn. flor. lapp. p. 290. n. 363. tab. 7. fig. 5. tab. 8. fig. p.

DESCRIPTIO.

Frutex pedalis quatuor pedalis. Ramuli fusco-virides. Rami annotini subtomentosi. Folia novella utrinque villosa

glauca, basi subferruginea, margine revoluto, serrulata, aetate provectiore integra. Folia matura, supra glauco-viridia, subtus albida tomentosa. Stipulae minimae ovatae acutae caducae.

Mas.—Amenta subterminalia semiuncialia ovata; foliolis quinque caducis ad basin inaequalibus, quorum maximum longitudinis est amenti. Squamae nigrae. Antherae luteae.

Foeminae—Planta mare procerior, vernatione praecocior. Amenta subterminalia ovata villosa; foliolis septem caducis ad basin. Squamae nigrae.

Fumat 1 Maji post frondescentiam.
Vegetatio finita ante 1 Septembris.

Place—First observed 29th June 1771, on the rivulet which runs down from the mountain of Creg-na-Caillich towards Finlarig, at the head of Loch Tay, Perthshire.

Observation—In a garden, where it has stood fifteen years, it is not yet five feet high.

XXII. SALIX *linearis.*

S. FOLIIS subserratis linearibus acutis distichis planis, subtus tenuissime villosis.

Salix minime fragilis, foliis longissimis utrinque viridibus. Raj. syn. p. 449. n. 14.

Salix Rubra, foliis integerrimis glabris lineari-lanceolatis acutis. Huds. Flor. Angl. p. 428. n. 12.

Angl. Stone Rod. Horn Rod.

DESCRIPTIO.

Rami annotini rubri glabri.
Arbor mediocris. Stipulae duae lineari-ovatae.
Vernatio revoluta.

Foemina—**Amenta subterminalia ovata sursum secunda. Involucrum foliolis 5 lanceolatis integris villosis. Squamae nigrae albo-villosae. Stigmata luteo-viridia. Floret 20 Martii dum vernat.**

Place—It grows naturally in the wood of Caerlaverock in Nithsdale, and is planted in the hedges in the neighbourhood. It grows also about Craigiehall in West Lothian, but in a cultivated state.

OBSERVATIONS.

1. From the examination of this plant in Buddle's Hortus siccus, in the British Museum, there can be no doubt of its being the above species of Ray and Hudson, though the leaf is evidently serrated.

2. Of all the Willows, its leaf is most exactly of the linear shape. It approaches in habit nearest to

the *vimenalis*, and agrees with it in the remarkable character of the vernatio revoluta, but is a distinct species.

3. Its leaves, like those of most of the Willows, are disposed on the branches in the Hexaple order; the sixth leaf always compleating the spiral on the branch. Yet, in general, the leaves appear at a distance, as if they were disposed on the branch, in a distichous order, and sometimes even as pinnated.

4. Though the female catkins are placed on the branch in the Hexaplous order; yet when in full flower, they are all twisted to one side, and point upwards. This is the meaning of their being sursum secunda.

Use—It affords a very tough and flexible rod, much more slender than that of the *vimenalis*, and better adapted for the finer sorts of wicker work.

(The remainder in a subsequent volume.)

XIII.

MAMMALIA SCOTICA*.

PRIMATES.

VESPERTILIO.

* *Auriculis simplicibus.*

VESPERTILIO *murinus*, caudatus, naso oreque simplici, auriculis simplicibus capite minoribus. Linn. Syst. p. 47.

Brit. The Bat. Angl. The Fluttermouse or Flittermouse. Gael. Dialltag, Jalltag.

Habitat speluncis, arboribus cavis, domibus: Praedator nocturnus, lucifugus.

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* Specimen of a FAUNA SCOTICA.

* * *Auriculis duplicatis.*

VESPERTILIO *auriculatus*, caudatus, naso oreque simplici, auriculis duplicatis capite minoribus.

Vespertilo lactans. Jonston. Aves. p. 34. tab. 20.

DESCRIPTIO MARIS.

Dentes xxxii numeravimus.
Primores superiores 4 acuti distantes.
inferiores 4 acuti contigui.
Laniarii superiores 6: anticis maximis acutis.
inferiores 6: anticis majoribus.
Molares utrinque 6.
Aures duplicatae, capite multo minores.
Exterior major ovata obtusa.
Interior minor brevior lanceolata.
Palmae palmato-alatae maximae, pollice unguiculato.
Plantae pentadactylae fissae, digitis pilosis unguiculatis.
Cauda geniculata, 6 articulis.
Membrana juxta caudam, margine ciliato.

Observ.—Loco, tempore, moribus, priori similis. E latebris volitat circa 20 Aprilis.

VESPERTILO *auritus*, caudatus, naso oreque simplici, auriculis duplicatis capite majoribus. Lin. Syst. p. 47.

Vespertilio murini coloris, pedibus omnibus pentadactylis, auriculis duplicibus. Brisson. quadr. p. 160.

Habitat in Anglia, rarissimus. In Museo D. Lever conservatus.

Observ.—Auriculae externae maximae, longitudinem pollicis humani superantes, et etiam toto corpori ferè aequales.

F E R A E.

PHOCA.

PHOCA *vitulina*, capite laevi inauriculato. Lin. Brit. Seal. Angl. Soile, Sea-Calf. Scot. Selch.

Tempus.—Parit circa Lismoram mense Majo.

Locus.—Habitat oceano Britanniam alluente, at maxima copia, in mare Deucaledonico. Ibi consociatae pariunt scopulis desertis procellosis, a consortio humano, aut navigiis procul remotis.

Mores.—Animal amphibium, et ut fertur, monogamium. Velocissimè natat, capite globoso supra aquas eminente. Pervigil, oculatissimum; urinator egregius, inter flammam sclopeti et sonitum, certo certius submergens, moxque extra teli jactum, iterum surgens. Supra scopulos gregatim dormiunt, sed scapha appropinquante, subito sese in mare praecipitant. Musicae perstudiosum. Super terram inhabile, graviter incedit saltando. Lapides pedibus projecit. Canem morsu repellit.

Usus.—Pinguedo corporis oleum coctura copiosissime praebet.

Cutis concinnè pilosa, diversicolor, pulchrè oculato-maculata, scriniola arcasque portatiles tegere inservit, etiamque vestimentis utitur. Caro esculentus porcino similis.

CANIS.

CANIS *familiaris*, cauda sinistrorsum recurvata. Lin. Syst. p. 56.

Brit. The Dog.

Inter varietates Canum ferè innumeras, hae sunt nobis notiores.

α. C. scoticus, capite elongato, rostro attenuato, trunco curvato, pilo denso crispo.

Canis scoticus venaticus. Gesn. quadr. p. 249.

Canis griseus, Ossiani.

Scot. The Grey Dog. The Deer Dog. The rough Greyhound. The Ratche.*

Omnium altissimus. Griseus, auribus brevibus acutis. Mystaces densae. Corpus longum postice attenuatum. Visu venatur. Venatione cum magistro ambulat, subinde astans, acriter circumspicit. Sectatur cervos, capreolum, vulpem.

β. C. grajus, capite elongato, rostro attenuato, trunco curvato, pilo sparso laevi.

Canis venatorius. Jonston quadr. tab. 71.

Brit. The Smooth Greyhound.

Forma elegans. Incessu decorus. Omnium velocissimus.

Prioris consanguineus, a caeteris autem valde remotus.

γ. C. sanguinarius, rostro obtuso, auribus labiisque pendulis, major.

Canis (molossus.) magnitudine lupi, labiis ad latera pendulis, corpore toroso. Linn. Syst. p. 57.

Canis sagax sanguinarius. Gesn. quadr. p. 251.

Canis sanguinarius. Raj. quadr. p. 177.

Brit. The Blood Hound. Scot. The Slow Hound.

Est e maximis. Albidus maculis magnis fuscis. Aures latae elongatae. Latratus gravis profundus.

dus. Venatur cervum, vulpem. Apud Majores usitatus ad vestigia praedonum investiganda.

δ. C. leporarius, rostro obtuso, auribus labiisque pendulis, minor.

Canis venaticus minor. Raj. quadr. p. 177.

Brit. The Beagle.

A priori ortus, similis sed minor, velocior.

ε. C. indicator, auribus pendulis, pilo recto promisso splendente.

Canis aviarius seu Hispanicus. Raj. quadr. p. 177.

Brit. The Pointer. The Setter. The Land-Spaniel.

Albus maculis magnis fuscis rotundatis. Perdocilis, mitis. Venatur aves latentes a Tetraone *urogallo*, ad Alaudam *arvensem*, Linn. Per arvas longè latéque circumcursat, astans, venatori praedam indicat, cauda porrecta.

Ex Hispania olim allatus.

ζ. C. aviarius, auribus pendulis, pilo longo undulato.

Canis aviarius aquaticus. Raj. quadr. p. 177.

Scot. The Scotch Spaniel.

Odoratus, cursus, mores prioris, at cutis crassior, pilis densioribus. Inde fortior cursu, inter vepres arbustorum.

η. C. terrarius, auribus erectis, corpore elongato hirsutissimo, pedibus brevibus.

Brit. The Terrier.

Est e minoribus. Crura praesertim antica crassissima torosa. Sutura longitudinalis inter pilos, per medium dorsi. Erectè nequit sedere, sed obliquè, ob longitudinem corporis. Venatione subterranea praecellit. Hostis pertinacissimus ferarum. Datur etiam pilo breviori laevi.

θ. C. taurinus, capite subgloboso, rostro obtusissimo.

Brit. The Bull Dog.

Omnium maximus. Animosus, collo turgido, atroci vultu. Pugnax, mordicus, pertinacissimus.

Custos aedificiorum, hortorum.

ι. C. mastivus. Raj. quadr. p. 176.

Brit. The Mastiffe.

Laniorum consectator.

κ. C.

ι. C. aquaticus, vellere crasso crispato, pedibus fissis.

Canis pilo crispo longo, instar ovis. Linn. Syst. p. 57.

Brit. The Water Dog.

Natator optimus, in arte urinandi autem, ut tota species, prorsus imperitus. Littoribus marinis, ubi aquae minimè sunt profundae, pisces, pleuronectes praecipuè, in arena latentes, investigat, corripit. Venatione utilis, ad aves ex aqua recuperandas.

λ. C. amphibius, vellere crasso crispato, pedibus subsemipalmatis.

Brit. The Newfoundland Dog.

Est e maximis. Ex Newfoundland advectus, ubi vitam agit ferè amphibiam.

μ. C. pastoralis, auribus brevibus erectis, pilo longo demisso.

Scot. The Coly.

Mediae magnitudinis niger. Ovium custos. Pastoris jussu longè latéque circumcursat, oves coercens, colligens, mira sagacitate. Subinde retrospiciens, ut mandatum de novo accipiat, voce aut signo magistri.

ν. C. carolinus, auribus longissimis pendulis, pilo longo undulato.

Brit. King Charles's Dog.

Est e minimis. Cauda postice comata. Niger, aut nigro-albus.

Primitus Europae meridionalis indigenus.

ξ. C. chinensis, minimus, auribus brevibus, capite subgloboso, rostro brevissimo subrecurvato.

Scot. The Dutch Pug.

Inter minimis. Inutilis. Forma minuta C. taurini.

E China in Hollandia olim advectus.

Locus.—Hospitatur in Britannia. An unquam indigenus?

Mores.—Naso sagacissimus, odorum differentias nobis incognitas sentit. Triticum *repentem*, Linn. medelae gratia carpit, pro emetico, asperitate sua inservientem. Quod evomuit, illico resorbet. Carnem suae speciei abhorret. Nonnullis musicae modulis miserè ululat. Ad annum vigesimum circiter ascendit. Quo major, eo audacior. Cauda huc illuc motante amicè accedit. Ab animalibus suae speciei, pro homine, se dissociat: et quod in natura singulare, pro eo pugnat. Domini assecla assiduus, tunc fortis et audax: solus, timidus nec sibimet fidens.

Animal pro socio hominis digito naturae designatum.

Canis *Lupus*, cauda incurvata. Linn. Syst. p. 58.

Brit. The Wolf.

Locus.—Habitavit olim in Britannia. Quondam incola Sylvae Caledoniae. In Scotia seculo xv extinctus, et postremò in regione Naverniae.

Canis *Vulpes*, cauda recta: apice albo. Linn. Syst. p. 59.

Brit. The Fox. Scot. The Tod.

Locus.—Habit. in sylvis, et inter rupes.

Mores.—Cavernam subterraneam multiforem pro latebra effodit. Praedatur aves domesticas, agnos, haedos, oves, at hircum vix audit invàdere. Cum Cane *familiari* procreat. Proverbio insidiosus. Homine captus, vultum placidum pro tempore induit. Canibus laceratus, ne vel querelam aut gemitum edit. Omnino indomabilis, feritate ad mansuetudinem nulla arte emollienda.

Usus.—Pellis in vestitu usurpatur.

FELIS.

FELIS.

Felis *Catus*, cauda elongata fusco-annulata, corpore fasciis nigricantibus; dorsalibus longitudinalibus tribus; lateralibus spiralibus. Linn. Syst. p. 62.

Brit. The Wild Cat.

Locus.—Habitat sylvis densis obscuris. Praedatur aves domesticas, agnos. Nidificat arboribus cavis. Parit Majo.

β F. domestica, discolor minor, cauda breviore tenuiore.

Brit. The House Cat.

Ubique domestica notissima, a priore, procul dubio, orta.

Mores.—Domo non incolis alligata, ædes, mutante hospite, deserere recusat. Catulos faucibus prehendit, eosque collo ad nidulum vehit. A leone illaesa, cum canis dilaceratus fuit. Stercus sepelit: an conscia illius odorem esse indicem exitiosum sui?

Usus.—A quibusdam gulosis editur. Pellis pro vestimentis utilis.

MUSTELA.

MUSTELA *Lutra*, plantis palmatis nudis, cauda corpore dimidio breviore. Linn. Syst. p. 66.

Brit. The Otter.

Locus.—Habitat ad ripas fluviorum paludosis. Urinator optimus.

Usus.—Pellis ad scloppos equitum tegendos. Pro togis et manicis foeminarum pellitis.

MUSTELA *Furo*, pedibus fissis, tota luteo-alba, oculis rubris.

Mustela pedibus fissis, oculis rubicundis. Linn. Syst. p. 68.

Mustela pilis ex albo subflavis vestita. Brisson. quadr. p. 177.

Brit. The Ferret.

Locus.—In Britannia exotica, vix Europae indigena. Africae incola esse dicitur, indeque ad nos translata.

Nunquam in Scotia perfectè cicurata, sed pro vivariis cuniculosis, carcere detenta, ubi coeunt, pariunt, et foetus educant.

Usus.—In cuniculorum venatione utuntur, nam meatus subterraneos ingredientes animantes expellunt. Cum eas in meatus dimittunt, labia consuunt ne cuniculos morsu petant et dilanient. Cuniculos unguibus scalpunt donec eos fugere et exire cogant. Raj.

MUSTELA *Martes*, pedibus fissis, copore fulvo nigricante, gula pallida. Linn. Syst. p. 67.

Scot. Martrick. Brit. Martin. Angl. Martern, Martlet. Gael. Tugan.

Locus.—Habitat insulis Haraia et Lodhusa. Montibus scopulosis desertis sylvarum vacuis.

OBSERVATIONES.

1. Longitudo a naso ad apicem caudae 2 ped. 10 unc. Longitudo caudae pedalis.

2. Vetustate gulam habet magis lutescentem, et pilos aliquot albos cum nigris mixtos in cauda.

3. Fulvum colorem nullibi in corpore observare licuit, nisi in gula.

4. Martes, cum cujus pellibus magna est commercia, ex America boreali, nostro omnino similis est.

5. La

5. In Hebridibus prehensae sunt, capsis vimineis carne inescatis, apertura qua ingredi possunt, at reverti nequeunt.

6. Pellis plerumque venditur pro quinque solidis Anglicis.

Usus.—Pellis in usu est pro fasciis collaribus, aliisque vestimentis foemineis.

MUSTELA *Putorius*, pedibus fissis, corpore flavo nigricante, ore auriculisque albis. Linn. Syst. p. 67.
Brit. The Foumart. Angl. Polecat, Fitchet.

Locus.—Habitat cella subterranea fabricata in sylvis, presertim ad radices arborum annosiorum.

OBSERVATIONES.

1. Longitudo a rostro ad caudam extremam 2 ped. 5 unc. Longitudo caudae 7 unc.

2. Odore putido insignis, inde Putorius et Foumart, quasi Foul Mart vel Martes putida, velut distincta a Mustela *Marte*, seu suave, quae odorem moschatum emittit.

3. In Argathelia majuscula, maculam elongatam albidam, inter oculos et aures gerit.

4. In Escia percognita est cum Mustela *Furo* generare.

5. Columbaria ingurgitando ova devastat. Cuniculorum hostis infestissimus.

6. Aves domesticas praedatur, sed imprimis eas decollat.

7. Currit corpore incurvato undulanti.

Usus.—Pelles pilosae pro vestimentis e Britannia ad imperium Turcicum commercio deportatæ sunt.

MUSTELA *Erminea*, pedibus fissis, corpore rutilo subtus albo, caudae apice atro.

Mustela pedibus fissis, caudae apice atro. Linn. sp. p. 68.

β. M. *candida*, tota candida, caudae apice atro.

Mustela candida, s. Ermineum. Raj. quadr. p. 198. Linn. syst. p. 68.

Brit. The Ermine. Angl. Stoat. Gael. Nass.

Locus—Habitat alpibus Breadalbinae et Lornae superioris, ubi variat colore, hyeme et aestate, ut in aliis locis. Rara.

Observatio.—Incolae referunt, si equi dum in pascuis alpinis aestate degunt, gramen decerpant super quod hoc animal catuliens transiit, subito ore tumefacto laborant, et protinus, ultimo vitae periculo, totum corpus tumescit. Ut minimum appareat, quod equi hoc dolore nusquam affecti sunt, nisi in montibus ubi haec Mustela incolat. Soliti sunt equos submergere, eosque in aquis agere pro solo remedio in hoc morbo.

Usus—Pellis pretiosa togas magistratuum ornat.

Mustela *agilissima*, pedibus fissis, corpore ravo, subtus albo, cauda concolore.

Mustela vulgaris. Raj. quadr. p. 195.

β. M. *nivalis* tota nivea. Mustela pedibus fissis, corpore albo, caudae apice vix pilis ullis nigris. Linn. syst. p. 69.

Brit. The Weasel. Angl. Weesel. Scot. Whittered. Gael. Ness.

Locus—Habitat ubique acervis lapidum, muris antiquis. Animal agilissimum, inquietum, saltatorium.

URSUS.

Ursus *Arctos*, cauda abrupta. Linn. syst. p. 69.
Brit. The Bear.

Locus—Ex Romanis scriptoribus, et antiquariorum operibus, abunde patet, Ursum olim fuisse Britanniae incolam.

Ursus *Meles*, cauda concolore, corpore supra cinereo, subtus nigro, fascia longitudinali per oculos auresque nigra. Linn. syst. p. 76.

Brit. The Badger; the Brock. Angl. The Pate or Gray.

Locus—Habitat sylvis lapidosis, ubi latebram multicavatam effodit, introitu autem solitario. Procul a latebra vix digreditur.

Usus—Caro quibusdam est in deliciis, porcino similis. Pellem villosam praebet, crassam, rigidam.

TALPA.

Talpa *europaea*, caudata, pedibus pentadactylis. Linn. syst. p. 73.

β. T. *alba*, tota albida.

Brit. The Mole. The Moldwarp, improprie Moldywort. Ang. The Wart.

Locus—Habitat ubique sub terra, agris, pratis, hortis.

Mores—1. Animal subterraneum lucifugum, nostrorum mammalium pilis brevissimis densissimis mollissimis.

2. Grumos suos nunquam ejicit in arena, argilla, luto, aut cespite, sed humo solùm. Quo humus est pinguior, ad putredinemque provectior, eo vermibus magis repletus est, et Talpae gratior.

3. Lumbricum terrestrium adeo vorax est indagator, ut si spatulam ferream in humo infiges, et ea terram quatias, lumbrici hunc esse motum Talpae credentes, ad auras subitò ascendunt, et superficiei prorepunt. Qua arte, lumbrici facilè colligerentur pro usu piscatoris.

4. Meatus cylindricos horizontales, ad profunditatem triuncialem effodit, praelongos, quibus huc illuc ad libitum transit.

5. Grumos talpae versus cacumina montium vidimus ad altitudinem 2000 pedum supra maris superficiem.

Usus—Pellis pilosa in usu est pro vestimentis, pileolis.

SOREX.

SOREX.

Sorex *Araneus*, cauda mediocri, corpore subtus albido. Linn. syst. p. 74. Mus araneus. Raj. quadr. p. 239.

Brit. The Shrew. Angl. Shrew-mouse or Hardy Shrew. Scot. Erd-shrew.

Locus—Habitat agris, pratis, hortis.

OBSERVATIONES.

1. Maxilla superior in rostrum porci instar producta est.

2. Felis eum acriter indagat et occidit, sed fastidio quasi rejicit.

3. Venenatum esse auctores asserunt, sed de loco, natura et effectibus hujus veneni silent.

ERINACEUS.

Erinaceus *europaeus*, auriculis rotundatis, naribus cristatis. Linn. syst. p. 75.

Brit. The Urchin, The Hedge Hog.

Locus—Habitat nemoribus et sepibus antiquis, in latebra fabricata, ubi hybernat.

OBSERVATIONES.

1. Animal, ut appareat, timidum, innocuum. Arma sua sola ad se tegenda.

2. In horto utile ad bufones, ranas, lacertas, insecta vermes, destruendas.

CASTOR.

Castor *Fiber*, cauda ovata plana. Linn. syst. p. 78. Brit. The Beaver.

Locus—Castores olim Britanniae indigenas fuisse, ex literarum monumentis constat, jamdudum autem et funditus deleti. Eos, seculo duodecimo, in uno tantum Cambriae fluvio, unoque Scotiae, extitisse traditur.

GLIRES.

LEPUS.

Lepus *timidus*, cauda abbreviata, corpore fusco, auriculis apice nigricantibus.

Brit. The Hare. Scot. The Maukin.

Locus—Habitat arvis, pratis. Cubile conficit apricis, semitectum gramine, filice, ulice; aut inter glebas sui coloris ingeniosè latitat.

Mores—1. Phytophagus velocissimus, auditu acerrimo, tremulus levissima aura.

2. Dum feram vitam agit, pavidus, tremebundus, domo autem cicuratus, petulans et fronte verè perfricta evadit.

3. Per diem in cubili quietus delitescit, vespere prorepit, per varias ambages pabulans oberrat, nec reditu iter mutat, sed per easdem revertit.

4. Soli natalis, amantissimus. Viciniarum chorographiam et pericula sua optimè intelligit. Praeda omnium, ipse innocuus; hostes perplures, totidem dolis deludit.

5. Fugatus edita petit. Oculis supra modum extantibus consectatores respicit, in directum autem ferè coecutiens. Accipitre in coelo apparente, etiam canibus persecutus, statim sub aliquo umbraculo decumbit.

6. Corticem et surculos arborum juniorum hyeme devorat, sed prae omnibus, Cytisi *Laburni*. E plantis hortulanis, Diantho *Caryophyllo* imprimis delectatur.

7. Decennium vix attingit.

8. Patentibus oculis dormit. Plin. hist. lib. 11, cap. 37.

9. Leporem surdum celerius pinguescere reperiamus. Plin. hist. lib. 39. cap. 20.

Usus—Pili molles et densi quibus vestitur, ad pileos texendos utilissimi. Pellis villosa vestimenta praebet. Caro esculenta nigricans.

β. L. *alpinus*, corpore cinereo-albo, auriculis apice nigris.

The Alpine Hare. Scot. The White Hare. Intolerandi rigoris alumnum. Plin.

DESCRIPTIO.

Varietas prioris minor, colore, loco, moribus diversa.

Hyeme corpore cinereo-albo, at prorsus candido, sine ullis pilis nigricantibus intermixtis, nobis nunquam repertus.

Aestate minus albus, magis cinereus, sed fuscum colorem *timidi* nunquam attingit.

Auriculae hyeme, posticè albae, anticè cinereo-albae; apicibus nigris. Aestate posticè albae, anticè subfuscae, apicibus nigricantibus.

Locus—Habitat versus cacumina montium Scotiae altissimorum, locis scopulosis. Monte Cruachan dicto in Argathelia, Ben Nevish in Abria, et praesertim montibus in Rossia occidentali, ubi frequentissimus est.

OBSERVATIONES.

1. Verè alpinus, ultra 1500 pedes supra oceani superficiem, raro descendens. Statio propria inter

1500

1500 et 2000 pedes, ubi comite Tetraone *Lagopo* compascit.

2. Ad aliquot centenarios pedum infra montis apicem semper nidulatur.

3. Moribus *cuniculum* aemulatur. Cubile superficiale nunquam fabricat, sed intra scopulos, et sub terra latitat. E latebra longinquus vix invenitur, et excitatus in ea subito se mergit. Nec velocitate nec cursu producto, cum *timido* certat.

4. *Alpinus* in montibus, et *timidus* in vallibus proximis, sese dissociatos tenent, nec ad cujusque sedes unquam appropinquant.

5. Lorna superior a viciniis segregata est, oceano, sinubus maris, et montibus editissimis. In ejus montibus Lepus *alpinus* abundat, sed *timidus* in illa regione nunquam notatus fuerat, ante annum 1768. Quo anno huc coactus fuit, ex Abria et Lorna media, universa venatione vulpis.

LEPUS *Cuniculus*, cauda abbreviata, auriculis nudatis, corpore supra cinereo, subtus albo.
Brit. The Rabbit. The Cony.

Locus—Habitat locis siccis apricis, praecipue maritimis. Ibi latibulas suas, solo arenaceo, facile effodiunt: Nec hyeme adeo nive, ut in loca mediterranea, infestantur.

OBSERVATIONES.

1. Animal natura gregarium, facile cicuratum, et cunicularis arte preservatum. Omnium mammalium foecundissimum.

2. Subterraneum lucifugum, vix nisi mane et vespere e latibulis egrediens.

3. Phytophagum, ruminans? naribus motitantibus. Victitans gramine, herbis: saepe etiam fucis, et inde caro nauseosa. Frugibus vicinis molestissimus. E plantis hortulanis praecipue delectatur lactucis, brassicis.

4. Locis montosis, ut in Escia, pelles praebet pilosiores et pretiores, quam in maritimis.

5. Omnem humiditatem abhorrent, et hinc fluvii iis terminos praescribere inserviunt.

β. L. *niger*, totus niger.
Habitat insulis in sinu Loch Snisort dicto sitis, ad plagam occidentalem Scidiae insulae.

γ. L. *albus*, totus albus, oculis rubris. Cicur hactenus incarceratus.

Usus—Pellis pilosa vestitu adhibetur. Ex pilis, pilei et tibialia conficiuntur. Caro esculenta alba.

MUS.

Mus *terrestris*, cauda mediocri subpilosa, palmis subtetradactylis, plantis pentadactylis, auriculis vellere brevioribus. Lin. syst. p. 82.

Scot. The Water Mouse.

Locus—Et terra et locis aquaticis degit. Hortis infestissimus, praesertim in vicinia aquarum sitis. Semina et radices consumit.

Mus *amphibius*, rufo-niger, cauda pilosa corpore breviore truncata, plantis pentadactylis palmatis.

Mus, cauda elongata pilosa, plantis palmatis. Linn. syst. p. 82.

Brit. The Water Rat. Scot. The Water Ratten.

DESCRIPTIO.

Dentes primores incurvi brunei s. buxei coloris. Superiores concavi semiunciae longitudine. Inferiores subulati.

Aures latae, externè pilosae, internè nudae.
Mystaces. Unica sub singulo oculo, setis circiter 10.
Oculi parvi.

Locus—Habitat locis siccis maritimis, alibi aquosis. In Iona insula, inque insula Acmona, aestuario Bodotriae jacente.

Mus *Rattus*, cauda subnuda corpore longiore, palmis tetradactylis unguiculo pollicari, plantis pentadactylis.

Mus cauda elongata subnuda, palmis tetradactylis cum unguiculo pollicari, plantis pentadactylis. Linn. Syst. p. 83.

Brit. The Rat. Scot. The Ratten or Rotten.

Locus.—Habitat domibus, horreis, frumentariis, macellis carnariis. Nobiscum nunquam arvis.

Mus *fossor*, fuscus, cauda subnuda, corpore aequali, palmis tetradactylis unguiculo pollicari, plantis pentadactylis.

Brit. The Norway Rat.

Locus.—Habitat arvis ubi cuniculos agit. Domibus quarum fundamina interdum suffodit. Saepe navibus. Locis aquaticis etiam degit, natat. Pistrina frumentaria, et stagna molaria, sunt sedes ejus exoptatissimae.

OBSERVATIONES.

1. Primum delatus, ut fertur, in Scotia, navibus e Norvegia.

2. Ubicunque sedes suas figit, Murem *Rattum* penitus fugat.

3. Mus *Rattus*, *amphibius*, *fossor*, in Annandia antehac penitus ignoti fuerant. Inde memoriae traditum, quod haec animalia in illa regione vivere nequeunt. Qua de causa, terra Annandiae, magna cura, nec minore ineptia, in regiones longè dissitas asportata fuit, ad Rattos destruendos. Circa viginti autem abhinc annos, Mus *fossor* e navibus ad ostium fluvii Annandi appulsis, in terram expositus fuit, nuncque per totum ferè Annandiae tractum dispersus est. Mus *Rattus* et *amphibius* verò in Annandia nondum apparuerunt, oceano, tractu alpino et fluviis profundis circumvallata.

Mus *Musculus*, cauda elongata subnuda, palmis tetradactylis, plantis pentadactylis: pollice mutico. Linn. Syst. p. 83.

Brit. The Mouse.

Brit.

Locus.—Habitat ubique domibus, vix cognitus in arvis.

Verè polyphagus, nullum esculentum parcens.

β Mus niveus, totus niveus, oculis rubris.

Locus.—Habitat locis subterraneis.

Nidus ejus cum catulis detectus fuit, ad Sarcam amnem, inter Angliam et Scotiam terminum. In sepulchro fodiendo apud Tinmouth in Northumbria. Fodinis carbonariis Scoticis interdum etiam invenitur.

Obs.—1. An color albus a situ subterraneo natus?

2. Color albus rubro oculo comitatur, ut in Lepore *Cuniculo* albo.

Mus *avellanarius*, cauda elongata pilosa, corpore rufo, gula albicante, pollicibus posticis muticis. Linn. Syst. p. 83.

Brit. The Dormouse. Angl. The Sleeper.

Locus.—Habitat sylvis, praesertim coryletis. Nuces, grana in cella sua acervat. Ibi a fine autumni ad veris initium latet. Hybernatio interpellata.

Mus *sylvaticus*, cauda mediocri, palmis tetradactylis, plantis pentadactylis, corpore griseo pilis nigris, abdomine albido. Linn. Syst. p. 84.

Scot. The Field Mouse.

Locus.—Habitat sylvis, arvis, hortis.

In agro Medicaginis *sativae* detectus, apud Ardbiglen, in Gallovidia inferiore, mense Octobris. In hortis semina et radices rodit. Nunquam in domibus nobiscum invenitur.

SCIURUS.

Sciurus *vulgaris*, auriculis apice barbatis, palmis tetradactylis, plantis pentadactylis. Linn. Syst. p. 86.

Brit. The Squirrel. Gael. Feorak.

Locus.—Habitat sylvis, praesertim coryletis. In sylvis Lornae superioris, antehàc copiosè, nunc rarior.

Obs.—Nuces, fructus, semina, ad hybernum victum, in latibula sua deponit. In arbore nidificat, et foetus fovet. Agilissimè transilit de ramo in ramum. Facile cicuratur.

PECORA.

CERVUS.

CERVUS *Elaphus*, cornibus ramosis totis teretibus recurvatis. Linn. Syst. p. 93.

Brit. Species, The *Red Deer*.—Mas, The *Stag* or *Hart*.—Foemina, The *Hind*.—Pullus, The Calf.

Locus.—Habitat saltibus, sylvis, montibus, ericetis.

Olim per totam Britanniam vulgatissimus, nunc in Anglia rarissimus. In Valentia nullibi hodie extat, nisi in montibus Gallovidiae. In regionibus Transforthanis adhuc superstes, copiosè.

Scotorum regibus solenni venatione, quingentos, octingentos, aliquando mille cervorum una strage saepe occisi.

Tempus.—Cervus coitus desiderio corripitur circiter 15 Septembris. Cerva per novem fere menses gestat, et circa medium Junii parit.

Cornua Cervus dejicit initio Aprilis. Novella celerrime pullulant, sed membrana villosa obducta sunt ad finem Julii.

Victus.—Victitat gramine, herbis; sed arborum frondes magis sunt in deliciis. Ramos annotinos, et corticem arborum juniorum, hyeme mirè devastat.

Taxum *baccatam* sine injuria tondit. Hinc sylva taxea insulae de Lonach, in lacù Lominio sitae, ubique decerpta est, quousque cervi porrigere possent.

Plantas submarinas hyeme, in Hebridibus copiosè pascitur.

Colubrem *Berum* avidè devorat.

Longaevitas.—Vita Cervis in confesso longà est, humanae ut videatur subaequalis, forsan superior. A Lesslaeo * episcopo certiores faciemur, quod Cervi vastae magnitudinis, iique numerosissimi, in Megetlandia circa annum 1578 reperiuntur. Anno autem 1763, ultimus Cervorum illius regionis, inter montibus vicinis Anandiae occiditur. Cervam ejus plus quam triginta annos antea amiserat, a quo tempore, solitarius inter montes, omnibusque incolis notus, oberravit. Aetas hujus Cervi ulterius non apparuit, sed cornua grandaevum esse planè indicaverunt. Ad longitudinem 2 ped et 8 unc. porrecta fuere, perquam tenuia, apicibus incurvatis acuminatis: sed prorsus simplicia et indivisa, ramo tantum solitario frontali ad basin. Numerus ramorum in hac specie, maturitate, ut appareat, augeatur, senectute autem minuatur.

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* De Gest. Scotor. p. 13.

Non decidunt castratis cornua, nec nascuntur. Plin. Hist. Lib 8, cap. 32.

Mores.—Animal gregarium, placidum, facile cicuratum, velocissimum, aspectu nobile, cornibus auribusque erectis, omnium rerum miraculo stupens. Odoratu solertissimum, qua de causa, venatores cum eum indagant, ventum studiosè declinant.

Strenuus natator, fugatus, confestim aquas petit. Autumno, fluctus lacus Lominii, per tres milliaria gregatim tranant, ad segetes adverso littore spoliandas. Cornibus depositis, velut inermis, opacis occultat, et noctu pascitur. Vulnerátus, etiam sub umbra degit.

Fugit secunda semper aura, ut vestigia cum ipso abeant.

Musicae perstudiosus, cursum etiam in fuga sistit, et aures dat vacuas modulis. Venator tibia utriculari comitatus, certus erit, licet palam in conspectu, intra teli jactum accedere:

Si gregis dux in medios hostes, et pericula praesentissima irruat, omnes, facto agmine, intrepidè sequantur.

Pecora omni-generis, eorumque pascua effugit. Cum Cervo *Capreolo* compascere recusat, ob subitos pavores, impetusque instantaneos, quibus haec meticulosa species perpetuò incutitur. Nobiscum enarratum est, Cervum sauciatum, ad Anthericum *ossifragum* se recipere, eoque incumbere, hancque herbam magna vi vulneraria pollere. Sed de his vix liquidò constat.

Usus.—Pellis pilosa pro instrato equestri adhibetur. Cortice macerata, corium praebet validum.

Cornu pro variis instrumentis utile, et pro sale alcalino volatili.

Caro alimentaria, facillimae concoctionis.

Aegagropilam seu pilam cervínam vidimus, e ventriculo Cervi in montibus Breadalbinae extractam. Nuce moschata major est. Figura globosa, superficie glaberrima. Color griseus. Substantia levis, firma, cultro rasilis, pilis vix ullis intertextis. Habitu gluten animale induratum referens.

CERVUS *germanicus*, cornibus teretibus, ad latera incurvis, collo infra jubato. Brisson. Quadr. p. 59.

Hippelaphus. Raj. Syn. p. 87.

Tragelaphon. Plin. Hist. lib. 8. cap. 33.
Germania. Brandhirsch.

Locus.—Habitat Misniae saltibus, Bohemiae vicinis. Jonston.

Animal certe admodum rarum, a Cervo *Elapho*, ut appareat, distincta species. Quondam Britanniae incola.

Cornua in Lismora insula nonnunquam defossa sunt, cespite obruta, et semel cum sceleto integro.

OBSERVATIONES.

1. Animal majus, crassius, robustius Cervo, villis nigris in gutture quasi barbatum. Jonston.

2. Descriptio cornu in Lismora reperti.

Cornu subrectum, longitudinaliter lirato-sulcatum, liris tuberculosis.

Versus superficiem tantum solidum, intus cancellis repletum.

Rami acuti teretes, quatuor secundi, quinto adverso.

Gibbositas supra basin rami secundi, sursum ad ramum tertium fastigiatim extenditur.

Versus apicem latius crassius, ipso apice trifido, segmentis crassis brevibus obtusiusculis.

Longitudo tetrapedalis. Periphaeria 7 unc., sed 9 ad basin. Dilatatio trium segmentorum apicis pedalis.

Cervus *Capreolus*, cornibus ramosis teretibus erectis: summitate bifida. Linn. Syst. p. 94.

Brit. Species, The *Roe Deer*.—Mas, The *Roe*, The *Roebuck*.—Foemina, Scot. The *Rae*.—Pullus, The *Fawn*.

Locus.—Habitat montibus subalpinis sylvigeris inviis. Regionibus alpinis Rossiae, Invernessiae, Argatheliae, et Comitatus Berthensis. Olim in Anglia, nunc exterminata.

Tempus. Capreolus initio Augusti copulat, et rursus sub finem Novembris. Capreola prima copula, sterilis persistit, sed secunda pullum parit circa primum Junii. Capreolus cornua dejicit fine Novembris, et membrana villosa tecta sunt ad finem Martii.

Usus. Pellis pro vestimentis, et pro corio.
Cornua pro manubriis cultellorum.
Caro exquisita digestione citissimè fugiens.

OBSERVATIONES.

1. Cornu dextrum majus crassius, summitate saepè trifida.

2. E cervis minima, Caprae magnitudine magnopere cedens. Forma perelegans, visu acerrimus, velocissima, ad proverbium fera, pavida, tremula; omnes terrent aurae, muscas praetervolantes metuens.

3. Coërcitionis impatiens. Solitarius circa domum cicuretur, sed plures in vivario ad mansuetudinem educari nequeunt.

4. Nonnulli eorum in vivario secluso apud Taymouth, sedem ill. Comitis de Breadalbane, per aliquot annos, et sine ulla molestia, religati fuerunt, sed prorsus indomiti et infertiles permanserunt.

CERVUS *Dama*, cornibus ramosis recurvatis compressis: summitate palmata. Linn. syst. p. 93.

Brit. Species, The *Fallow Deer*. Mas, The *Buck*. Foem. The *Doe*. Pullus, The *Fawn*.

β. C. albus, totus albus.
Brit. The *White Deer*.

γ. C. niger, totus niger.
Brit. The *Black Deer*.
Ex Holsatia, a Jacobo VI. primum, ut fertur, in Scotia allatus.

δ. C.

3. C. fasciatus, corpore fulvo, maculis rotundatis albis, fascia longitudinali dorsali nigra.

Cervus pulchritudine Zebrae Africanae minimè cedens. Raj. quadr. p. 86.

Brit. The *Menalled Deer*. The *Mottled Deer*.

Obs. 1. Ex India orientali delatus, ut fertur, a D. Harrison, anno 1720, et exinde in Britannia magnoperè propagatus fuit, sed antehac, ut appareat, in Anglia receptus fuisset.

2. Primo anno, cornua gerit parva brevia teretia indivisa, apice incurvato acuto, Prickets dicta.

Secundo, majuscula, subcompressa, ramo frontali solitario.

Tertio, magis compressa, ramis duobus frontalibus.

Quarto, majora et palmata evadunt.

Quinto et Sexto, adhuc ampliora magisque palmata, sed ramis tantum duobus, ut tertio anno.

Septimo, maxime dilatata, spatiosissima, ramis frontalibus tribus.

Locus.—Habitant saltibus, vivariis. Species in Scotia, ut videatur exotica. An Angliae vera indigena?

Usus—Pellis pilosa pro instratis equestribus. Corium etiam depstum suppeditat optimum utilissimum.

utum. Cornu pro instrumentis, et pro sale alcalino volatili. Caro plerisque in deliciis habita.

OBSERVATIO.

In vivaria ill. Comitis de Hoptoun in Lothiana occidentali, Cervus *Dama*, albus et niger per sexaginta annos, colores suos, sine ulla mistura, distinctissimos servarunt, donec *fasciatus* in vivario introductus fuit. Ab eo tempore, tres priores, soboles coloribus a suis diversas genuerunt.

CAPRA.

CAPRA *Hircus*, cornibus carinatis arcuatis, gula barbata. Linn. Syst. p. 94.

Brit. Species, The *Goat*. Scot. *Gait*. Mas, Scot. The *Buck*. Castratus, Scot. A *Hæcerel*. Pullus, A *Kid*.

Locus.—Habitat montibus scopulosis praeruptis. Loco aliis inaccesso praecipue delectatur, inter rupes editissimas asperrimas dumosas.

In Europa, exotica; primitus ex Oriente adducta.

Tempus.—Caprae apud Ardmady in Argathelia, bis pariunt quotannis. Primò sub finem Januarii, et rursus initio Augusti. Haedi posterioris partus, alios, pro mensa, magnoperè praecellunt.

Victus.—Pascitur gramina, herbas. Tondit et decorticat arbores, frutices. Inter herbas, prae aliis pecoribus, verè polyphaga. Flores herbarum omnibus aliis pecoribus devitati, avidè ab ea ingurgitantur. Corticem Taxi *baccatae*, Tabacum, et Colubrem *Berum*, illaesa devorat.

Usus.—Pellis pilosa ad manticas et scloppos equitum tegendos, pro vidulisque peditum viatoriis inservit. Ex pilis caliendri sunt compositi. Corium pro cingulis : haedinum pro pergamena, et manicis foemineis optimum.

Cornu pro instrumentis corneis variis.

Lac ejusque serum, in medicina usurpantur. Caseum et sebum copiosè praebet.

Caro vetustiarum olida. Hircina autumno praesertim, odore teterrimo vitiatur. Haedina autem grata saluberrima.

OBSERVATIONES.

1. Morsus arbori exitialis. Noctu ut interdiu cernant. Pinguetudine sterilescunt. Lactentes generant.

rant. Mutilis lactis major ubertas. Auribus eas spirare dicitur. In Africa desunt. Plin.

2. Pilis non lana vestitur, crassioribus hirco. Nobiscum omnes cornutae.

BOS.

Bos *Taurus*, cornibus teretibus extrorsum curvatis, palearibus laxis. Linn. Syst. p. 98.

Brit. Species, *Black-Cattle. Horned Cattle.* Mas, Taurus, A *Bull.* Foemina, Vacca, A *Cow.* Pullus, Vitulus, A *Calf.* Castratus, An *Ox.* Foemina junior. A *Heifer.* Scot. A *Quey.* Annosus, Scot. A *Stirk.*

Locus.—Habitat ubique cultis. Campos depressos graminosos maximè eligit.

β. B. Urus, cornibus crassis, brevibus, sursum reflexis, fronte crispa. Brisson. quadr. p 53.

Urus. Caesar. de Bello Gallico, Lib. vi. cap. 5.

Locus.—Habitat etiamnum ferus, in Polonia et Hungaria. Scotiae olim incola? Caput, cornua, ossa, magna hujus animalis, cespite obruta, in

Teviotia et Lismora insula, ut videatur, reperti fuerint.

γ. B. Scoticus, cornibus sursum reflexis, juba longissima. Brisson. quadr. p. 55.

Bison albus Scoticus, vel Calydonius. Gesn. quadr. p. 122. fig. p. 123.

Bison Scoticus. Jonston. quadr. p. 37.

Bos sylvestris. Lesslaeus de Gest. Scotor. p. 19.

Locus.—Habitavit olim in sylva Caledonia, ubi seculo 16 superstes fuit.

Pecudes feri, hujus generis, solùm adhuc persistunt, in sylvis circa Drumlanricum in Nithia, sedem ill. Ducis de Queensberry. Coloris sunt candidissimi, auribus nigris.

δ. B. muticus, capite mutico.

Locus.—Habitat passim in Britannia, mansuetus, cum variet. α, praesertim in Scotia septentrionali.

Frontis ossium maxima durities.

Tempus.—Vita foeminis 15 annis longissima, maribus 20. Robur in quimatu. Domitura boum in trimatu, postea sera, antè praematura. Vacca decimo mense parit.

Epiroticis Bubus laus maxima, a Pyrrhi jam inde regis cura. Id consecutus est, non ante quadrimatum ad partus vocando. Plin. Hist. Lib. viii. cap. 45.

Pilos quotannis dejicit.

Victus.—Gramina brevia, herbasque tenellas, decerpere vix potest.

Pastus Viciae *Craccae*, Vaccas ad coitum praecociorem excitat.

In Hebridibus plantas submarinas pascitur, et Fucum *digitatum* prae omnibus.

Inter frutices nostras, salicibus praesertim delectatur.

Vaccae nonnullae, secùs quam natura fert, lintea vorant.

Vacca Trifolium *pratense* sativum adeo ingurgitet, ut ad necem inflatur.

E pastu radicum Pteridis *aquilinae*, in arvis exaratis, boves in Gallovidia interfecti fuerunt.

Oenanthe *crocata*, mortem certam citam violentam affert.

Taxo *baccata* etiam necatur.

Morbi.—Pecudes Insulis Cannae et Ethicae morbo fatali sunt obnoxii cum foras devehuntur. Alvo constipata statim prehensi sunt, urinam sanguinolentam emittunt, tuncque duarum triumve dierum spatio intereunt.

In Hebridibus, pecudes alii morbo, The Scour, dicto, magnoperè expositi sunt. Sub finem veris, et aestatis initio, hic morbus praecipuè se diffundit. Expurgatione violenta foecum fluidarum, plus quam ordinariò, nigrarum constat. Hactenus insanabilis. In genere, ut appareat, illabetur.

Morbus pecudum, in Gallovidia, aliisque montosis Scotiae grassatur, nomine, The *Black Spauld* cognitus. In aliquo crure, praesertim postico, sedem habet. Membrum subitò et improvisè impotens evadit, et post mortem, nigrum, spongiosum et subputridum esse invenitur.

In montosis, Pediculo *Vituli*, pecudes admodum infestati sunt.

Oestrus *bovinus*, solo sonitu, armenta Barrae insulae, in furorem agat.

Usus.—Emolumenta hujus animalis fructuosissimi, multa, magna, notissima.

OBSERVATIONES.

1. Animal lentum pigrum patientissimum. Taurus cum alio bellicosissimus. Irritatus, minacitèr terram pedibus cornibusque in altum furiosè projicit.

2. Omnes varietates hujus speciei, a Bove *Uro* prognatae sunt.

3. Taurus castratione mugitum perhorridum, vultumque torvum amittit. Cornua etiam magnoperè augentur.

augentur, et figuram diversam assumunt. In Tauro brevia rectiuscula; in Bove multo longiora, et valdè incurvata.

4. Aegagropila pilosa in ventriculo, sese lambendo, formatur.

5. Greges hujus speciei, ut et Suis *Scrofae* et Caprae *Hirci*, Hebridienses habebant, medio VI seculi. Adamnan. Vit. Columb. Lib. i. et 2.

BELLUAE.

EQUUS.

EQUUS *Caballus*, cauda undique setosa. Linn. Syst. p. 100.

Brit. Species, The *Horse*. Mas, a *Stallion*, a *Stoned Horse*. Scot. A *Cuisser*. Foemina, Equa, A *Mare*. Pullus, A *Foal*. Castratus, Cantherius, A *Geld*-

A *Gelding*. Mas junior, Equulus, A *Colt*. Foemina junior, Equula, A *Philley*.

Locus.—Campis et pascuis riguis gaudet.

In Europa exoticus, primitus Asiae interioris indigena.

Tempus.—In arvis Britanniae per integrum annum pascetur, quod paucis aliis terrae tractibus obtinet.

Cantherius annum quadragesimum tertium, nobiscum attinet.

Aetas, ut fertur, maribus longior.

Mense duodecimo parit.

Victus.—Gramen proprium alimentum. Fruges tamen habet in deliciis. Avenam victitat in frigidioribus, Hordeum in calidioribus regionibus. Vescitur radices esculentas.

Morbosus, Conium *maculatum* edit.

Mores.—Animal pulcherrimum velocissimum docillimum, bello fortissimum. Memoria pollens. Societate gaudens. Stans dormit. Cadavera abhorret. Iratum dentes denudat, mordet. Primo alterius obtutu, ringens, consortio amantissimum. Sono tubae aut cornu solito, ad praelium aut venationem validè excitatur : Aures arrigit, nares inflat, hianit, frena cum strepitu rodit, terram quatit pedibus, et ad locum refrenari spernit. Terriculo ad insaniam agitur.

Quo quis acrior, in bibendo profundius nares mergit. Plin. Hist. Lib. viii. cap. 42.

OBSERVATIONES.

1. Diversicolor, at in cicatrice semper albus.

2. Albos et leucophaeos, prae aliis, caecitati esse obnoxios, experientia cohortis regiae Scoticae patet.

3. Insulis Zetlandicis Equi ad staturam Canis maximi minuuntur.

EQUUS *Asinus*, cauda extremitate setosa, cruce nigra supra humeros. Linn. Syst. p. 100.

Brit. The Ass. Foemina, The she Ass, or milk Ass. Pullus, The Colt.

β. Mulus, hybridus ab Equa et Asino. γ. Hinnus, hybridus ab Asina et Equo. Brit. A Mule.

Locus.—In Europa exoticus, petrosis, Africae interioris, indigena.

Animal utilius calidis quam nostris terris.

Minor et segnior climate frigido.

Tempus.—Trigesimum annum attingit.

Mulum LXXX annis vixisse Atheniensium monumentis apparet. Plin. Hist. Lib. viii. cap. 44.

Parit mense duodecimo.

Victus.—Pabulo exiguo, ciboque vilissimo contentus.

Pascitur gramina, herbas, frutices.

Potu maximè pinguescit.

Usus.—Asinus ad onera portanda.

Asina pro lacte suo aestimato servata est.

Mulus ad equitandum quibusdam adhibetur.

Corium ex cute, durissimum, solidissimum, glaberrimum.

OBSERVATIONES.

1. Sitis frigorisque impatiens. Paritura lucem fugit, et tenebras quaerit.

2. Frigoris maximè impatiens, nec equinoctio verno, ut caetera pecua, admittitur, sed solstitio. Plin. Hist. Lib. viii. cap. 43.

3. Et Mulus et Hinnus omnino improles sunt.

SUS.

SUS.

Sus *Scrofa*, dorso antice setoso, cauda pilosa. Linn. Syst. p. 102.

Brit. The Wild Boar, or Wild Swine.

Obs.—Unicolor, niger, dentibus laniaribus inferioribus longe exsertis horridis.

Locus.—Adhùc in Germania, aliisque locis ferus.
Nobiscum, cicur interdum vivariis.
Olim Caledoniae indigena.
Effugium Div. Columbae ab Apro mirae magnitudinis in Scicia insula, ab Adamnano describitur. Vit. Columb. Lib. iii. cap. 8.

β. Sus domesticus, caudatus auriculis oblongis, acutis, cauda pilosa. Brisson. quadr. p. 74.

Sus, Linn. Syst. p. 102. Variet. *β*.

Brit. Species, The *Hog*. Mas, Aper, The *Boar*. Foemina, Sus, The *Sow*. Pullus, Sucula, A *Pig*. Castratus, Majalis, A *Hog*.

Locus.—Cicuratus vulgatissimus.

γ. Sus sinensis, caudatus, ventre ad terram usque propendente, cauda pilosa. Brisson. quadr. p. 75.

Sus chinensis. Linn. Syst. p. 102. Variet. γ.

Locus.—In Britannia cicur, e China allatus. Corpus nigrum subnudum.

Tempus.—Dentes persistentes. Quindecim annos attinet. Per quatuor menses uterum fert. Parit bis anno.

Victus.—Vescitur gramina, herbas, praesertim succulentas.

Radices succulentas varias, magis autem in deliciis habet.

Plures plantas respuit, quam caetera quadrupeda phytophaga. Quisquilia, stercora, variaque immunda, aliis quadrupedibus intacta, vorat. Farinacea, fructus, vermes, serpentes, carnes, cadavera, etiam proprios foetus foedissimè ingurgitat, verè polyphaga. Saginatur in Suecia pane e cortice Pini *sylvestris* confecto.

Lycoperdon *Tuber* omnibus cibariis praefert.

Usus.—E setis varia genera scoparum conficiuntur.

Anatomici, ope setarum in foramina et minimos canales inquirunt.

Sutores illis pro arista filorum carere nequeunt.

Dentibus utuntur deauratores ad laevigandum deaurata.

aurata. Pellis corium praebet, pro ephippiis operiendis, optimum.

OBSERVATIONES.

1. Animal gregarium, segne, somnolentum. Caput obliquum in incessu. Torpidum, crapula contracta, cubili sterquilineo soli exposito, volutat. Plures foetus quam alia mammalia parit. Contra hostes mutuò sese juvant.

2. A Sue *Scropha*, reliquae varietates cicuratae, procul dubio, originem trahunt.

3. Ad fodiendum, inhabilis facta est, sectione duorum musculorum, qui osse zygomatico inserti sunt, et rostrum elevant.

4. Index Suis invalidae, cruor in radice setae dorso evulsae. Plin. Hist. Lib. viii. cap. 5.

OVIS.

Ovis *Aries*, cornibus compressis lunatis. Linn. syst. p. 97.

Ovis domestica. Raj. quadr. p. 73.

Brit. Species, The *Sheep*. Mas, Aries, A *Ram*. A *Tup*. Foemina, A *Ewe*. Annicula, Brit.

Agnus, A *Lamb*. Castratus, Vervex, A *Wedder*. Bima, Bidens, Scot. A *Hog*; Angl. A *Lamb-Hog*. Foemina Bidens, Scot. A *Gimmer*; Angl. A *Theave*. Trima, Scot. A *Twinter*; postea, a *Ewe*. Castratus trimus, Scot. A *Dinman*.

VARIETATES.

β. O. anglica, mutica, capite pedibusque albis, cauda ad terram dependente.

Ovis mutica, cauda scrotoque ad genua usque pendulis. Linn. syst. p. 97.

Angl. a Pollard, or Polled Sheep. Scot. A Mug Sheep. Incola camporum patentium, pascuis laetissimis nutrita. Lana longissima, mollissima. Cornutis mitior, delicatior, morbisque proclivior.

γ. O. rustica, cornuta, capite pedibusque nigro-albis, cauda brevissima.

Minima, alpium et ericetorum sterilium incola. Lana brevis, crassa, interdum fusca, grisea, in Hirta insula griseo-coerulescens.

δ. O. collaris, cornuta, capite pedibusque nigris, collari lanoso.

E minoribus. Scotiae cisforthanae incola. Lana crassa.

ε. O. polycerata, cornibus pluribus. Ovis polycerata e Gothlandia. Linn. syst. p. 97.

Minima alpina, cauda brevissima, quatuor et etiam sex cornibus interdum donata. Caput, pedes, nigro-alba. Lana brevissima, pilosissima.

Habitat in insula Vista australi. Anno 1578 oves in Tuedia, cornibus ternis, quaternis, et etiam senis, instructae fuerunt. Lesslaeus de gestis Scotor. p. 13. Res hodie in illa regione penitus incognita.

Locus—Habitat apricis, siccis, etiam sterilissimis. Animal in Europa exoticum, primitus Africae indigena. Maritimis foecundior, lactisque uberior.

Tempus—Ovem ultra tredecim annos provectam nunquam vidimus: post novenarium autem annum vix cum proventu pascendam. Loco et pascuo, longaevitas plurimum dependet. Pastores nostri vellera ovium sterilium circa 25 Junii tondunt, sed foeminarum fertilium circa 20 Julii. In Scotia coeunt, Septembre et Octobre: in Italia antem Junio et Julio. Hebdomada vicesima post coitum parit.

Victus—Omnibus plantis tenellis praecipue delectatur. Eriophorum *vaginatum*, primo verc, alimentum gratissimum suppeditat. Radices Bunii *bulbocastani*, Potentillae *argentinae*, Tritici *repentis*, et Avenae *nodosae* nostras, arvis exaratis cupidè devorat. Senecionem *Jacobaeam* aliis pecoribus nauseosam, vere carpit et exterminat. Agaricum *campestrem* edit, et Juniperum *communem*, qui a morbis eam conservat. Spartium *scoparium* si ovis ingurgitet, statim temulenta evadit, decumbit, et pro tempore, ambulare nequit. Haec affectio autem, usui continuo plantae caedit. Juncus *squarrosus*, in montosis Scotiae, victum praebet ovibus utilissimum hyberno tempore; gramen, si ullum aliud, maxima vi frigoris, sempervirens. Radices crassas avidè etiam effodiunt.

Laeditur omni pastu succulento, pascuis palustribus, multisque; plantis acrioribus ibi crescentibus; praesertim, Pinguicula *vulgari*, Drosera *rotundifolia*, Hydrocotyli *vulgari*, et Lysimachia *tenella*. Thymum *Serpyllum* respuit. Gramen e fimo ortum exitiale.

Vellis—Lana mollissima, e pascuo jucundissimo, climateque mitissimo oritur, et vice versa. Climate intemperato, utrum frigore vel aestu, lana in pilos degenerat. Hinc, in Africa et India, oves pilosiores sunt, quam in ipsa Islandia. Hinc, lana hispanica, e montibus tenuissima, in vallibus crassa est. Lana laete crescit, dum ovis pinguescit; macescens autem lana crescere desinet. Quo lana durior, eo animal robustior. In nonnullis locis Scotiae septentrionalis, vellera bis anno tondentur. Oves non ubique tondentur: durat quibusdam in locis vellendi mos. Plin. hist. lib. viii. cap. 48. Hicce mos in Orcadibus adhuc obtinet.

Morbi—Ovis in pascuis montosis morbo obnoxia est, hactenus insanabili, colonis admodum damnoso, the Trembles, dicto. Paralysis faciem gerit. Animal humo sternitur, et absoluta nervorum resolutione, in posterioribus corporis partibus miserè succumbit. Duobus anni temporibus, hic morbus potissimum praevalet, tempore nimirum pullulationis et procidentiae Pteris *aquilinae.* Causa adhuc ignota. Pteris in suspicionem venit, sed ab Ove intacta est. Spartium *scoparium* oves ab hoc morbo conservat.

Alii morbo, the Rot, s. the Sickness, dicto, oves magnoperè sunt expositae. Primò, ad viscera sanguinis concursus, tunc inflammatio, denique gangraena superveniunt. Ex gramine stercorato, vel nimium succulento, plerumque oritur.

Myrica *Gale*, ut ab aliis pecoribus, sic ab Ove evitatur. Si autem duro necessitatis telo, ad hanc fruticem pascendam urgetur, certo certius morbo lethali icterico corripitur. Cutis post mortem undique flavicat. Morbus hicce pastoribus nostris nomine, the Yellows, nuncupatur.

Ovis, morbo, the Cling, dicto, correpta, foeces liquidas nigras ejicit, et confestim extenuata, morte occumbit.

Statu macilento, aut obeso, Ovis diu sana persistere nequit.

Usus—Omnium animalium humano generi utilissimum.

OBSERVATIONES.

1. Animal gregarium, sequax, placidum, timidum, imbelle. Inediae patientissimum. Magna vi nivis ineunte avidissimè pascitur.

2. Vellis in omnibus plerumque album, in singulis autem varietatibus, penitus nigrum interdum invenitur.

3. Dentes primores agnini tenues 8; sed saepe 6 tantum gerit. Ex iis, duo medii, post primum annum sunt decidui; alii duo laterales utrinque, post secundum: duo alii post tertium; denique, quarto anno consummato, duo postremi cadunt. Hi dentes sic binatim dejecti, duobus aliis validioribus suppleti sunt, persistentibus, donec aevo pereunt.

4. Cornua foeminis tenuiora, breviora, rectiora. Cornua nunquam pullulant, si animal castratum est ante eorum exortum: post exortum, ulterius nunquam crescunt.

5. In quibusdam Scotiae Pascuis montosis siccis, dentes tartaro, faciei metallicae, aureique coloris, obducti sunt.

CETE.

MONODON.

1. **Monodon** *Monoceros.* Linn. syst. p. 105.
Ceratodon. Brisson. quadr. p. 231.
Scot. Unicorn Fish.
Habitat oceano circa Groenlandiam et Islandiam. Circa insulas Zetlandicas interdum versatur.

OBSERVATIONES.

1. Corpus longitudine saepe viginti pedalis. Cornu s. dens in maxilla superiore septempedalis.

2. Cornu solitario semper a nostris piscatoribus Groenlandicis observatur, nec e medio sed semper e latere sinistro maxillae orto.

3. Cornu in Monocerote scotico, nihil habet in natura sibi magis simile quam cornu hujus piscis borealis.

Balaena

BALAENA.

BALAENA *Mysticetus*, naribus flexuosis in medio capite, dorso impinni. Linn. syst. p. 105. n. 1.

Balaena major laminis corneis in superiore maxilla, fistula in fronte, bipinnis. Sibbald, Phalain. Sect 3. cap. 1.

Brit. Greenland Whale. Whalebone Whale.

Habitat oceano arctico glaciali.

Littoribus Scotiae interdum ejecta.

Observ. 1. Ejecta fuit, anno 1682, in Oram Buchaniae, prope urbem Peterhead, septuaginta pedes longa. Sibbald, Phalain. p. 28.

2. Laminae corneae hujus speciei, os cetaceum mercatura notissimum praecipue suppeditat.

BALAENA *Physalus*, fistula duplici in medio capite, dorso extremo pinna adiposa. Lin. syst. p. 106. n. 2

Brit. Fin Fish.

Habitat oceano septentrionali.

Littoribus Levisae insulae interdum jacta.

BALAENA *Musculus*, fistula duplici in fronte, maxilla inferiore multo latiore. Linn. syst. p. 106. n. 4

Balaena tripinnis maxillam inferiorem rotundam, et superiore multo latiorem habens. Sibbald Phalain. Sect. 8, cap. 4. tab. 3.

Habitat oceano arctico.

Catervas clupearum ad littora Scotiae sequitur. Sinum Lelanonium in Argathelia quotannis ferè visitat, ubi per aliquot hebdomadas in Augusti et Septembris mensibus conspicitur, harengos devorans, nec a navibus piscatoriis numerosis perterrita.

Observ. Septembri mense anno 1692, Balaena hujus speciei juxta Abercornum in sinu Bodotriae projecta fuit, septuaginta et octo pedes longa. Sibbald.

PHYSETER.

Physeter *Catodon*, dorso impinni, fistula in rostro. Linn. syst. p. 107. n. 1.

Balaena minor, in inferiore maxilla tantum dentata sine pinna aut spina in dorso. Sibbald Phalain. sect. 1. cap. 2.

Habitat oceano septentrionali.

Observ.—Anno 1693, centum et duae hujus speciei apud portum Kairston in Orcadibus, eodem tempore,

pore, ejectae fuerunt. Ex his maximae, viginti quatuor pedes erant longae, quaedam octodecim, nonnullae autem duodecim tantum. Sibbald.

PHYSETER *macrocephalus*, dorso impinni, fistulâ in cervice. Linn. syst. p. 107. n. 2.

Balaena macrocephala, quae binas tantum pinnas laterales habet. Sibbald. Phalain. sect. 2. cap. 1.

Scot. The Bottle Nose.

Habitat oceano septentrionali.

Littoribus Scotiae interdum ejîcitur, praesertim sinu Bodotriae.

Observ. 1.—Ad longitudinem 8 pedum crescit. Quadraginta duo dentes maxilla inferiore inhaerent. Sibbald.

2. Mense Martio anno 1768, animal hujus speciei ejecta fuit, prope Alaunam in littore Bodotriae, quinquaginta quatuorque pedes longum. Quadraginta quatuor dentes habebat in maxilla inferiore, sciz. viginti duo utrinque. Spermaceti e cerebro copiosè extractum fuit.

PHYSETER *microps*, dorso pinna longa, maxilla superiore longiore. Linn. syst. 107. n. 3.

Balaena macrocephala quae pinnam in dorso habet, et dentes in maxilla inferiore arcuatos falciformes.

Sibbald. Phalain. Sect. 2. cap. 2. tab. 1. fig. A.
Habitat oceano septentrionali.

Observ. 1.—Mense Februario anno 1689, animal hujus speciei in littore Bodotriae prope Limekilns ejiciebatur, quinquaginta duos pedes longum, a Sibbaldo conspectum.

2. Ad longitudinem 60 et ut fertur 70 pedum crescit. Caput mediam longitudinem totius piscis, dempta cauda, habet; et crassitudine reliquam corporis partem superat. Fistula duo foramina habet, quae uno operculo tecta sunt. Dentes 42 in maxilla inferiore, 21 in singulo latere, falciformes, novem pollices longi. Spermaceti magna copia in ventriculis cerebri congestum, et etiam in capite extra cranium ad duorum pedum crassitiem fuit aggestum. Sibbald.

Physeter *Tursio,* dorsi pinna altissima, apice dentium plano. Linn. syst. p. 107. n. 4.
Balaena macrocephala tripinnis, quae in mandibula inferiore dentes habet minus inflexos et in planum desinentes. Sibbald. Phalain. sect. 2. cap. 3.
Habitat oceano arctico, praesertim ad promontorium septentrionale Europae.

Observ. 1. Anno 1687, foemina praegrandis ejecta fuit in insula quadam Orcadensium. Caput ejus octo aut novem pedes altum erat.

2. Ultra

2. Ultra longitudinem 100 pedum crescere dicitur.

DELPHINUS.

Delphinus *Phocaena,* corpore subconiforme, dorso lato, rostro subobtuso. Linn. syst. p. 108. n. 1.

Brit. Porpesse. Delphinus pinna in dorso una, dentibus acutis, rostro brevi, obtuso. Brisson. quadr. p. 234. n. 2.

Scot. Pellock. Tumbler. Mere-swine.

Victitat Ammodyte. *Tobiano.* Linn.

Habitat in fretis et sinubus Scotiae frequens per totum annum. Harengos devorat et eorum catervas sequitur. Descriptio exarata fuit ex una quae sinu in insula Levisae sclopeto interfecta fuit, pilulis plumbeis minoribus.

Observ. 1. Dentes ab Artedi dicuntur mobiles. Reverà sunt omnino fixi, sed mandibula in qua positi sunt, aliquantulum est mobilis, cum dentes digito sunt depressi.

2. *Usus*—Oleum in carminatione lanae optimum copiosè praebet. Caro infumata apud Hebridianos vesca.

Delphinus *Delphis*, corpore oblongo subtereti, rostro attenuato acuto. Linn. syst. p. 108. n. 2.

Delphinus pinna in dorso una, dentibus acutis, rostro longo acuto. Brisson. quadr. p. 233. n. 1.

Brit. Dolphin.

Habitat littoribus Europae australis frequens.

Fretum Britannicum interdum visitat.

Delphinus *Orca*, rostro sursum repando, dentibus latis serratis. Linn. syst. p. 108. n. 3.

Delphinus pinna in dorso una, dentibus obtusis. Brisson quadr. p. 236. n. 4.

Balaena minor in utraque maxilla dentata, quae Orca vocatur. Sibbald. Phalain. sect. 1. cap. 1.

Brit. Grampus.

Scot. A North Caper.

Habitat mare Germanico, Hibernico, Deucaledonico, omni anni tempestate.

Observ.—A pedibus quindecim ad viginti quinque excrescit. Vorax, aliisque sui generis minoribus infesta. Dentes in unaquaque maxilla triginta diversae magnitudinis et formae. Fistula in fronte. Sibbald.

STATISTICAL ACCOUNT

OF THE

PARISH OF COLLINGTON*.

Climate.—The most remarkable occurrence to be noticed, with respect to climate, was what happened during the beginning of the present year 1795. On Christmas eve 1794, there fell three inches of snow which went off; but on the 14th of January a heavy snow took place, which was increased at different times, and continued on the ground till the 18th of March. No plough was yoked during this period of two months and four days. The depth of new fallen snow was exactly measured from time to time, and amounted to sixty-six and a half inches.

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* An abstract only of this Account was published in Sir John Sinclair's work—What follows completes the Statistical Account of that Parish.

The depth of new fallen snow, however, is greatly and suddenly lessened, by subsidence, evaporation, and intervals of thaw. From these causes, the greatest depth of equal snow, between the 14th of January and the 18th of March, was on the 12th of February, when it amounted to thirty-eight inches.

After a little temporary thaw, succeeded by an intense frost, when the snow was about this depth, it bore men and cattle on its surface, on the 28th of February, like so much ice.

During the time this deep snow remained, it was generally accompanied with great degrees of frost. At noon, on the 22d of January, the thermometer stood at 15°. It was frequently at midnight, between 15° and 5°. But on the 23d of January, at two in the morning, it fell to 2°, which was the greatest degree of cold observed.

On the 20th and 21st of January, there fell twelve inches of snow, and thirteen inches on the 26th and 27th. This snow, that fell on the 20th and the succeeding days, remained on the trunks and branches of the trees, and even on the twigs of the bushes, so severe and uninterrupted was the frost, till the 8th of February, when a little thaw took place, which brought it off.

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The depth and continuance of this snow, exceeded every thing within the memory of any person alive. In winter 1739—40, the frost continued longer, and by all accounts was more intense, but not attended with such a deep snow. It does not appear, that a snow so deep and of such duration, has occurred in this country since the year 1542, which was known for a long time after, and marked by some of our old Scots writers, by the name of the *evil storm.*

In Russia, Sweden, Norway, Canada, and Hudson's Bay, the fall of snow is confined to about the space of a month, in November and December. When it has completely fallen the weather becomes serene, and continues to be so till the snow begins to go off in the spring. In these countries, the depth of snow varies in different years, from three to six feet; for in Hudson's Bay it has been known sometimes not to amount to more than three feet. In our variable climate, such a depth of snow, in so short a space of time, seldom occurs: yet a greater quantity often falls successively, in the course of the winter. Of this the snow of last winter 1794—95, is a remarkable instance. Though it never was at one time deeper than thirty-eight inches, it amounted in all to sixty-nine and a half inches; which is more than what frequently falls in the Scandinavian countries. Yet some winters pass away

way in Scotland, in which the whole fall of snow does not amount to six inches.

The long continuance of the snow and frost during this winter, occasioned a material deficiency in the crop 1795, and was one of the causes of the remarkable scarcity in that year.

Its hurtful effects were most discernible in the wheat crop. The late sowing of wheat, now become a general practice, must, after every severe winter, be productive of such a calamity. The sowing of this grain, which should take place between the 20th of August and 1st of October, is now delayed till October is far advanced, and in many places till November and December. In such mild winters as we have had for some years, wheat sown so late may produce a very good crop; but it must necessarily fail if the winter is severe.

The wheat thus late sown in winter 1794, was overtaken by the snow on the 14th of January, when in the shot blade, just above ground. Had the snow continued but for two or three weeks, it would have received little injury; but it was essentially hurt, by lying under the snow for two months and four days, during the most intense frost. When the snow went off, this late sown wheat was partly killed or thrown out; and what remained, was yellow and weak. The consequence was a thin and a poor crop. The grain was tolerably ripened, but the diminution was not so much in the quality of the crop, as in the quantity upon the acre, which was greatly lessened. Wheat sown during the first fortnight of September, and well rooted before winter, would have withstood all this snow and frost without detriment. The great failure of the wheat crop, in the year 1795, is not, therefore, so much to be ascribed to the severity of the winter, as to the late sowing of that grain.

As the plough did not go till after the 18th of March, the sowing of beans was necessarily postponed far beyond the proper time. They accordingly afforded but an ill ripened and imperfect crop. The oats and the barley were delayed of course, till after their due season; and, as the summer turned out neither warm nor dry, these crops, and especially the oats, grew luxuriantly in the straw, but the grain never was sufficiently filled. The diminished produce of these grains at the mill, was a subject of general complaint, and became one cause of the then general distress. Thirty bolls of oats gave but twenty-four bolls of meal. This was the case on the shores of the Forth, where, at other times, oats give at least meal for corn. In other places the proportion was much less; and the muirland oats, which form the greatest part of the crop of Scotland, turned out to little account.

The beans, oats, and barley, were rendered unavoidably late and defective, by the seasons; as happened in the year 1740, by the long continued storm of the preceding winter. But the remarkable deficiency in the wheat crop, is to be attributed entirely to the lateness of sowing. These events of the crop 1795, may, with other reasons, persuade farmers of the error of their general practice, in sowing every kind of grain too late.

School.—There are but two countries in Europe, more remarkable than Scotland, for the learning and usefulness of their schoolmasters; these are Swisserland and Sweden. In these countries, there is a regular school in every parish, amply maintained at the public expence; and the masters, who are all remarkably well qualified, held in considerable respect. The great Gesner, one of the first and most successful restorers of learning, and the celebrated and elegant Castalio, besides many other men of note in literature, were schoolmasters in Swisserland. It was by these means, that the Swiss and the Swedes, though comparatively poor, have been, from the highest to the lowest, the best educated people in Europe: and this radical advantage has always appeared in their character, both as a nation, and as individuals.

The utility and importance of the parochial schools in Scotland, and of the parochial schoolmasters, an exemplary and excellent set of men, it is to be feared, have, of late years, been too much overlooked. In these seminaries, not only the literary education, but the conduct and character of the whole community, are deeply concerned. What is it that enables our countrymen to appear with so much advantage in every department, but the easy access they have to an early and good education? The highest part of the public character has always hinged upon letters and arms. In these, our nation has always been equal, if not superior, to other countries. But deprive Scotland of its accustomed education, and turn the bulk of its inhabitants into illiterate peasants, or uneducated, timid, and turbulent manufacturers, the national character, hitherto respectable, must become altered and degraded.

Public and considerable schools, we have in towns and other places, well calculated for the instruction of youth of a higher station. Yet it is not from a few persons of superior, or of any rank, that the character of a nation is to be taken, but from the body of the community at large. It is at the private parochial schools, that the mass of the people are to receive their education, if they are to have any at all. It is there they must first receive the principles of religion, morals, and government, and the rudiments of instruction for their future conduct in life. This, certainly, is a matter, that highly deserves the attention of the public, and of every government;

vernment; and it must be of the greatest consequence, that the qualifications of the persons, on whom this important public business is devolved, should be equal to the task.

When the salaries of the schools in Scotland were appointed by act of parliament, they were sufficient for obtaining well qualified teachers, but are now totally inadequate for that purpose. Many young men, who had received a complete grammar, and even a university education, in those days, had no better way of employing their talents. But the case is now entirely altered. Every young man, with a tolerable hand at writing, and a little knowledge in figures, can make, in a variety of ways, and particularly as clerk to a merchant, manufacturer, or tradesman, twice or three times more than he could gain as a parochial schoolmaster. For this reason, the qualifications of the schoolmasters in Scotland, are much inferior to what they were in former times. For want of proper encouragement, ignorant and ill qualified persons come to be employed; a misfortune to the country which, without some remedy, must become greater and greater.

The peasantry of the country, from the highest farmer to the lowest land-labourer, forms by far the most numerous, and a most important and excellent body of the people. But it is from the instruction they receive at the parochial schools, and from the principles which they there imbibe in religion, morals, and government, that they become such exemplary, useful, virtuous, and loyal citizens. The great success which attends the industry of our principal mechanics, manufacturers, traders, and merchants, is to be ascribed to the same cause. Great numbers, who go abroad with little more than a good education, return with their fortunes acquired by a life of ability and probity, and add greatly to the wealth and improvement of their country. Even those of the higher and of the highest ranks, who make such a conspicuous figure in the navy, in the army, and in the various departments of the state, may reasonably acknowledge that their great public utility, and their own glory as individuals, are, in a great measure, to be attributed to the early, liberal, and extensive education received at home. In fine, all that Scotland has peculiarly to boast of, must be ascribed to the early and good education of its inhabitants. On this, the national character, prosperity, and honour, have always depended; and upon this, as on a sure foundation, it is to be hoped, that they will still continue to be supported.

Poor.—Formerly, the poor in Scotland were supported, and in the most laudable manner in which poor can be supported, by voluntary charity. This was chiefly raised by the collection on Sunday at the church. But, of late years, many of the more opulent persons in a parish, have omitted this weekly contribution; the non-residing heritors are not always sufficiently attentive to the poor of the parish in which their property is situated, and the progress of manufactures has considerably increased the number of the indigent. Under these circumstances, it is fortunate for the poor, that the law has made a provision for them, independent of voluntary charity. Accordingly, legal assessments have taken place, through necessity, in several parishes. They are rendered excusable indeed, only through necessity, as they threaten to land at last in an established poors rate; a measure to be avoided if possible, as it deserves to be deprecated in every country.

It is commonly observed, that the poor of Scotland are chiefly supported by the poor, or, at least, by the middling and lower ranks. But, though this may not be the case in general, it must be confessed that, in many parts of the country, there is too much room for this observation. The commons of Scotland are, according to their power, beneficent and charitable to the indigent. A farmer and his family will give to the amount of a guinea, and even a farmer's servant, a couple of shillings yearly, to the poor of the parish; while a non-residing heritor of large property, gives not a penny. This, no doubt, is unequal and unreasonable; but, though this may, and certainly does often happen, it would be highly unjust to tax the proprietors of Scotland with want of liberality to the poor. The contrary has appeared on many occasions, and will always appear in every case of emergency: yet it must be admitted, that, in this matter of ordinary parochial charity, they certainly fail sometimes in point of attention. Were the residing heritors of a parish to give their weekly collection, and the non-resident heritors a proper annual donation, we should then stand in need of no legal assessments to defray the expence of the poor. Accordingly, in some parishes, where the funds of the kirk-session have become unequal to the demands of the poor, the heritors have set a laudable example in supplying the deficiency by a voluntary contribution.

It is surely more eligible for a man of property, to give an annual and voluntary gratuity for the support of the poor, than to have it exacted from him in course of law. To a nation also, it is certainly more honourable to sustain the indigent by one of the first of virtues, than by a compulsatory method; which augments the number of poor, and increases the expence of their maintenance; which entails a new and heavy tax on the landed property, and tends to diminish the industry of the people.

Assessments.—An assessment, in some cases, is now become unavoidable through necessity; and, though this necessity might certainly be obviated by the means above suggested, yet it must be allowed that an assessment is not without its advantages. It subjects, to contribution, the non-residing heritors, the sectaries, and all other proprietors and tenants, from whom otherwise, the parochial poor would receive nothing. It prevents the illiberality of some from being a burthen on the truly liberal. It is a tax likewise equal and fair, as it is exactly proportioned to the extent of property; and when it is high, makes an effectual provision for the indigent. But its disadvantages must also appear great to those who are well acquainted with the sentiments and manners of the poor.

It diminishes that degree of ignominy which the poorest person often wishes to avoid, by being himself, or by having any of his near relations, upon the poors roll. It is obvious that the poor make a clear distinction between the charitable offerings of the people, and money raised from heritors, by means of assessment. To the former, they make application, only from real necessity; but they grasp at the latter with avidity and avarice. It is generally with reluctance, that even the lowest people make their first application to the kirk-session for charity: but they are not so reluctant at receiving part of a parochial assessment, which they consider as a pension to which they are entitled by law. Though not forced by necessity, they are then tempted to apply for this charity; and when they have obtained it, are always less thankful and more dissatisfied, than in the case of alms voluntarily given them.

Having the prospect of a certain legal relief, by means of this tax, in the event of distress, the labouring people become less provident, less industrious, and not near so careful to provide against poverty, sickness, or old age. It diminishes likewise the anxiety of their relations to preserve them from poverty, to assist them in their distress, and to prevent them from coming upon the parish charity.

From the little experience that has occurred, it is also evident, that wherever assessments take place, there the inrolled poor not only become more numerous, but each is maintained at a much higher expence than where they have nothing to trust to but voluntary charity. In some parishes, while the number of people remains the same, if there is an assessment, the number of paupers continues to increase. In other parishes, the assessment has continued to augment, even though there has been no addition to the number of poor.

In every parish, there is a number of persons, not on the poors roll, who receive occasional charities, to no great amount indeed, being the least necessitous of the poor, but sufficient to encourage their industry, and to prevent them, not only from begging, but from being placed on the poors roll. These persons are often more numerous than the inrolled poor, and, if an assessment takes place, become all fixed annual pensioners at a high rate.

Hence

Hence arises the great addition to the number, and, consequently, to the expence of the inrolled poor, wherever an assessment is adopted.

Disputes concerning the residence of the poor, are happily very little known with us. The title which the law gives, from the place of birth, or three years residence, is just and reasonable. These two rules are generally observed, but observed as they ought to be, in a lenient way. Hence, we have no violent animosities about the residence of paupers; no law-suits are commenced: no expences are incurred; no severity shewn towards parishes whose poor are numerous, and whose funds are slender; nor any hardship inflicted on the distressed and helpless stranger. These are circumstances much to be wished for; but it is well known they could not be expected, were assessments of considerable amount to become general. They may be established, but it will be found that they are not so easily removed.

But, whether there be an assessment or not, the funds destined for the poor, can never be managed with more fidelity, or with so much usefulness, as by the kirk-sessions. The parochial charity in Scotland is a great sum; and it will be difficult to find, any where else, a fund to that amount, managed with so much care, and at no expence. Overseers of the poor, with salaries, are by all means to be avoided.

While the kirk-sessions are willing to undertake the task, the heritors can have no such factors in this matter. They are the men who have the most thorough knowledge of the state of the poor, and who, with strict economy and integrity, act without any fee or reward, excepting the high reward of doing so much good.

In many parishes, there is a stock in money or land, the revenue of which is annually applied to the maintenance of the poor. It is so considerable in some parishes, as to be a sufficient provision for the poor, without putting the heritors to any expence. This is certainly a most eligible situation; and for this purpose, the kirk-sessions well deserve to be encouraged in their endeavours to increase the parochial capital. To this, they are seldom disinclined; and in cheap times they can often do it, without any hardship upon the present poor.—Where such a capital exists, it ought never to be impaired. If an extraordinary call for charity occurs, which sometimes happens, it should never be answered by encroaching on this permanent fund, but by voluntary and temporary contribution. This not only preserves the capital, but keeps the excellent and amiable spirit of charity alive and in exercise, both amongst high and low.

By charitable donations, and by means of economy, many parishes are possessed of a considerable sum of money, bearing interest. This money is never lent out, but by the joint approbation of the heritors and kirk-session. Without any improper intention in these respectable bodies of men, but, by inattention, this money is sometimes given out on personal security, and is entirely lost. There have been so many instances of this, as to render it an indispensable duty with these guardians of the poor, and without any exception, never to lend any of the parochial funds, but upon the most unquestionable heritable security. Such donations, religiously bestowed for the best of purposes, ought to be religiously preserved.

In country parishes, where all the inhabitants are employed in husbandry, the heritors and tenants are the only persons who can reasonably be subjected by law, to support the poor. This was the case with all the parishes in Scotland, exclusive of towns, when the law anno 1672 was enacted. Accordingly, to this case the law was adapted; to this case it is still applicable; and for this case it is the best law that can be framed. But, since that æra, Scotland has undergone a wonderful change; such as has required the alteration of many laws; and such as demands a signal alteration in the law respecting the poor. The manufacturing and trading interests have since sprung up, and to a great extent, in many parts of Scotland. These produce a vast additional number of indigent persons in the country.

But if manufactures and trade have the advantage of the labour of those persons while in health and strength, to contribute to their relief, in indigence and old age, becomes strictly incumbent. Yet manufacturers and traders are not by statute amenable for their support. This must be confessed to be unreasonable; and the minds of the manufacturers and merchants in Scotland, a body of men as charitable as any of their fellow-subjects, are too much enlightened, and too just and liberal, to suggest the contrary, or to object to any measure on the subject, that is fair and beneficent. One important clause, therefore, in any new law respecting the poor, is to render the manufacturing and mercantile interests, liable in proportion for the support of the indigent, along with the proprietors of land and their tenants.

Computations.—By the nearest computation that can be made in round numbers, the inrolled poor in Scotland amount to thirty thousand, and those who receive occasional charity, to twenty thousand, making in all fifty thousand persons; a very serious proportion of the community, and, as it is believed, not over-rated.

To support this numerous body of poor, there are mortifications in lands, money, grain, and houses, and savings by the care and economy of the kirk-sessions, which form a stock of about 120,000l. in value.

The revenue arising from this stock, and the othe parochial funds, chiefly the collections at the church, amount to an annual income of about 40,000l., under the administration of the kirk-sessions. From this, the yearly expence of the church officers is to be deduced, which may be estimated at 3000l. But to this must be added, the annual sum in the few parishes already assessed, which may amount to 6000l., and which raises the yearly income to 43,000l.

It appears, therefore, in general, that the poor of Scotland, amounting to fifty thousand persons, have, of public parochial charity, about 43,000l. allotted for their support; which does not afford to each pauper 20s. yearly; a sum, it must be acknowledged, very inadequate to their necessities.

And further; that, even including 6000l. already granted in assessments, it does not appear that the heritors of Scotland contribute, in the way of parochial charity, to the amount of 25,000l. for the support of the fifty thousand poor which exist in the country; or, that the poor, in general, and at present, do not stand the landed interest 10s. each per annum.

The poors rates in England, are now estimated at a vast sum; but it does not appear what may be the whole number of paupers, or at what rate they are, upon an average, supported. In those parishes in Scotland, which are fully assessed, each pauper is maintained at an expence from 4l. to 9l. yearly. If assessments were to become universal, and were the poor of Scotland to be supported at the expence of only 5l. each, they would then stand the heritors ten times what they cost at present, as the sum required would amount at least to 250,000l.

Were the proprietors in Scotland willing to be at this great expence, was it needful, they would deserve much praise. But it is proper for them to know, that it is an expence by no means necessary: that, with less than one fourth of this great sum, properly bestowed, and without any legal compulsion, the poor of Scotland might be better supplied than the poor, perhaps, of any other kingdom.

Price of Labour.—Agriculture is the solid foundation, and ought to be the forerunner of manufacture. Of late years, however, manufactures in their progress, have outrun agriculture in Scotland: nor has this proceeded so much from the natural effort of the country, as from our connection with England. Husbandry is properly the nurse of manufacture; and it is to be wished that our manufactures had a reciprocal and friendly influence upon our husbandry. This, at least in one view, is far from being the case at present. The manufacturer can pay for labour, what the husbandman can by no means afford.

During the shortest days of last winter, a common labourer, employed by manufacturers in this parish, had 16d. a day. No proprietor can hold his lands with profit, nor any farmer pay his present rent, who is subjected to this price of labour. It, accordingly, bears hard upon the farmer. The hardship on the public may come in some degree to be compensated; as, it is to be hoped, that part of the wealth now gained by manufactures, may, in time, fall to be employed in the manufacture of the soil.

Till very lately, the common labourer had 10d. a day during winter, and 1s., or at most 1s. and 2d., in summer. The present call for the young men of the labouring class, to the army and navy, must affect the price of labour, and is already felt by an increase in the wages of those who remain in the country. At the above rate of wages, the subsistence indeed of a labourer's family is a matter truly surprising, if we consider the present price of all the articles of living. When allowance is made for the days in which he is debarred from work, by the state of the weather or other accidents, his income cannot be reckoned to exceed 13l. a year. Yet upon this, he has often to support a wife, with two, three, or four children; and when sober and industrious, supports them in a decent manner. The wife, generally, by her carefulness and industry, adds something. Yet, whenever the income and expence of a labourer's family come to be compared, as they have often been, and committed to paper, the expence, to a degree of surprise, always turns out higher than the income. Yet they live without running into debt, and thrive, and the children are brought up in a creditable way. This is much to the praise of the poor labourers in Scotland; and no reason can be given for it, but that there subsists among them a degree of frugality and parsimony, which escapes the knowledge and observation of people in higher life.

When the wages of day labourers were long ago regulated by statute, it seems to have been the intention of the Scots parliament, that the daily allowance of a labourer should be a peck of oat-meal. His wages, therefore, in money, were appointed by law, to be half a Scots merk, or 6½d., with a small fraction, sterling: and, on this account, they were long known by the name of half-merk labourers. This sum was, in those days, the medium price of a peck of meal. On this, the labourer was subsisted; and on the same quantity of oat-meal, or the value of it, he may be comfortably subsisted still. This seems to be the most steady and equitable rule, both for the labourer and his employer, wherever it can be carried into practice; that the labourer's daily allowance should be a peck of meal, or the current price of it, if he is to be paid in money: his wages to be 10d. or even 8d. a day, whenever the peck of meal is so low; but to rise to 15d. and even 18d. a day, whenever the meal rises to that price.

A married ploughman, with all his perquisites, has generally to the amount of 1s. every working day, or about 16l. a year.

The hire of a plough, with a man and two horses, during winter, for what is called a long yoking, is 4s.—In spring, when there are two yokings, the price is 3s. each yoking, or 6s. a day.

When this plough is hired to till by the Scots acre, the price is 10s. an acre. At one yoking a day, the plough is occupied upon the acre about two days and an half.

When harrowing is hired, it costs 2s. an acre, but 3s. when the ground is lee.

Agriculture.—The husbandry here is entirely regulated by the supply of dung which is brought from the city of Edinburgh. This local advantage leads to a peculiar method of farming; proper indeed for such a situation, though inapplicable to the country in general. There is, in this parish, and part of Corstorphine, a chain of six miles of farmers, experienced in this mode of cultivation, who, in point of skill and industry, are, probably, not surpassed by any farmers in Britain, occupying an equal extent of land.

Though their practice is by no means suited to Scotland at large, a knowledge of it may be useful in the neighbourhood of cities and towns; where a farmer possesses land from 20s. to 50s. per acre; and where he can have a sufficient supply of dung, exclusive of what his farm affords, with a carriage not exceeding four or five miles.

The practice of these farmers cannot be comprised within narrower bounds, than in a detail of the rotations which, from long experience, they have found to be the most successful and profitable.

These rotations, it is well known, must vary in some cases, from a difference in soils and seasons, and from other circumstances; yet the five following are what constitute the general practice.

Rotation I.—1st Year, clover and rye-grass hay.
2d Year, a second crop of the same.
When the hay is cut, a bastard fallow takes place, of three or four ploughings, with dung.
3d Year, wheat.
Sometimes, if the season does not answer for wheat, this land is reserved for barley, with half the dung that would have been laid for wheat.
4th Year, horse hoed beans.

5th Year, wheat.
6th Year, barley with grass seeds.

Rotation II.—1st Year, wheat.

After summer fallow, with forty double horse carts of dung per acre.

It is well known to our most intelligent farmers, that wheat, after a summer fallow, never suffers from being too early sown; though even so early as the end of August. Whereas, if late sown, it is more apt to fail, than after any other preparation of the soil.

2d Year, oats.

3d Year, horse hoed beans.

With two or three furrows, and fifty double horse carts of dung. But where the soil is light, horse hoed potatoes, with dung, are adopted, instead of the beans.

4th Year, wheat.

If any part of the beans has not been dunged, the dung may be added for the wheat. But dunging for the beans is always to be preferred, and among other reasons, for this—that too much work in autumn, often creates a disappointment in the wheat crop. If the season for wheat, upon this land, is lost, a crop of oats is taken, either upon a winter or spring furrow.

5th Year, barley, with grass seeds.
6th Year, clover and rye-grass hay.

Rotation III.—1st Year, oats, after clover and rye-grass.
2d Year, horse hoed beans.
With two or three furrows, and fifty double horse carts of dung.
3d Year, wheat.
4th Year, barley, with grass seeds.
5th Year, clover and rye-grass hay.
6th Year, oats, followed by summer fallow.

Rotation IV.—1st Year, summer fallow.
With forty double carts of dung per acre.
2d Year, wheat.
3d Year, barley, with grass seeds.
4th Year, clover and rye-grass hay, once cut.
5th Year, wheat.
With forty-five double horse carts of dung per acre.
6th Year, barley, with grass seeds.

Rotation V.—1st Year, oats, after clover and rye-grass.
2d Year, horse hoed beans.
With forty-five double horse carts of dung, and two or three furrows.
The first sown beans succeed best. They never make a good crop when sown after the middle of

of March. If sown in the beginning of February they seldom suffer, and then form the earliest, the largest, and best ripened crop.

3d Year, wheat.
4th Year, barley with grass seeds.
5th Year, clover and rye-grass hay.
6th Year, oats, followed by summer fallow.

In the above rotations, turnips are omitted, and are seldom cultivated. For this there are the following reasons: 1. On such high rented land, the other green crops, clover, beans, and potatoes, are more profitable. 2. Turnips in this part of the country, are not required for the reclaiming of wild land. 3. The dung produced by the feeding of cattle, the great article of profit on the turnip crop, is not here of that consequence, as where no dung is to be had but what the farm affords.

Since the introduction of horse hoed crops of beans and potatoes, the quantity of summer fallow has been, in some situations, very properly diminished. It still continues, however, to be the general practice. Of all the tillaged land in this parish, there is about one-twentieth annually under summer fallow. But it is a practice more necessary in the remote parts of Scotland, upon soils unfit for turnips, and where there is no command of dung.

In general, about one-sixth of the whole arable land in the parish, is under clover and rye grass; and a great part of this land, when broken up, is sown with oats.

The old tillaged soils here, as in other places, afford steady and regular, though not the most luxuriant crops; such as occur sometimes on rich old lands newly broken up. On the former soils, the white crops do not tiller to such a degree as on the latter, and they ought therefore to be sown thicker.

The farmers here, do carefully adapt their crop to the state of the land; an important point in agriculture, which, in many places, is too much neglected. Where a white crop would be dubious and perhaps fail, they take a green crop of beans or potatoes. Where the land is not completely prepared for wheat, they content themselves with a crop of inferior grain, barley or oats. In this way, the soil is never forced beyond its power. On these farms, as on others, the crops in different seasons are better or worse: but, by this management, there is rarely ever to be seen upon them what can be called a bad crop. On some of these farms, and those of considerable extent, the average increase of all the grains, wheat, barley, oats, and beans, will be nine, ten, and sometimes even eleven fold. Such an increase is seldom to be met with in other places; and it is not the effect of a soil naturally good, but produced by means of a liberal expence, and careful management.

But, though the farmers in this parish and neighbourhood have much merit, and though their practice in general is commendable and successful, there are still some alterations and improvements which may be suggested.

Fallowing.—Of late years, fallowing has perhaps been too much decried; for the greatest improvement in the soil, both of England and Scotland, has certainly been brought about by this practice. In remote parts of the country, where the soil is wild, or has been long neglected, fallowing is still to be considered as necessary for bringing it into proper tilth, and, indeed, as the introductory improvement to all others. It is chiefly requisite, and is indeed, in some cases, indispensibly necessary, where little or no manure can be obtained but what a farm affords.

The lands about Edinburgh, however, are in a very different situation. They have been, immemorially, tillaged and manured; they have the command of dung from the city; and having been every year, for a length of time, under a crop either of corn or of clover; though naturally in many places not good, the soil has been subdued and greatly improved. In this situation, it is presumed, that a summer fallow, which sacrifices a whole year's production of the soil, is neither necessary nor proper; and yet it takes place upon every farm to a considerable extent.

This practice, though laudable and even necessary in many places, is certainly inexpedient in the vicinity of Edinburgh, or of any other large city, and may be safely superseded by a fallow crop, that is, by a horse hoed green crop.

Horse hoed potatoes and beans have, for many years, been raised about Edinburgh; but they have not, as yet, much abridged the practice of fallowing, which they certainly ought. The other most expedient fallow crops, are turnip, Swedish turnips, cabbages, and coleworts. But these, hitherto, have been raised only in a few places, and in sparing quantity. It is unquestionable, however, both from reason, and from the experience of other countries, that one or other of these six crops may be profitably substituted in place of a summer fallow. This measure will, probably, be in time adopted by the farmers about Edinburgh; and, especially, when they come to deal more in the rearing and fattening of live-stock than they do at present.

To clear the soil of weeds, is justly reckoned one of the chief advantages of a summer fallow. But this useful purpose is more effectually answered by fallow crops. A summer fallow, indeed, destroys many weeds; but, when the land, after this, affords two or three white crops, and is allowed to go into grass for two or three years, the weeds come to arrive fully at their former strength. Though many weeds may be destroyed by a fallow in one year, the soil can never be cleared of them, if, after this, they are allowed to grow for four or five successive years, with little or no interruption; whereas, if ground is never suffered to go into grass, but is made to produce every year, corn, clover, or a fallow crop, the weeds, natural to the soil, must be diminished, and in time disappear.

Forty years ago, the fields about Edinburgh were the foulest in the kingdom. In June, the crop of oats could not be perceived. It was so overwhelmed with the skelloch * and the runsh †, as to appear like a full crop of mustard in bloom. These, and other pernicious weeds, have since been gradually and greatly diminished, not by fallowing, but by the horse hoed crops of potatoes and beans.

Pease.—The grey or field pea is sown here, and in most other parts of Scotland, as a meliorating crop; and always in broadcast, as it is incapable, from the manner of its growth, of being horse hoed.

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* Sinapis *arvensis*, Linn.

† Raphanus *raphanistrum*, Linn.

When the crop of pease is so luxuriant as to choak and suppress all weeds in the soil, it is then advantageous, and an excellent preparation for the following white crop. But this is very seldom the case. The pease crop is more rarely to be seen good, than any other; and generally, indeed, it is neither profitable in itself, nor friendly to the crop that succeeds.

If it happen to fail, which it most usually does, it becomes the worst of all bad crops, yielding neither grain nor straw to any amount. If its vegetation is not brisk, from the starting till it is in the pod, it falls before the weeds, and, as it is said, *goes away*. The appearance of a pease crop, however, remains on the ground till late in the season. In the mean time, the root-weeds strengthen, and the annual ones become luxuriant, and shed their seeds; so that nothing good is to be expected from the following crop, and the ground remains poisoned for years.

This is always, and must be the case, wherever the soil is weak or weedy. But, even upon soils that are in heart, and tolerably clean, the pease crop frequently fails. No crop depends more upon the nature of the season; and, indeed, a full pease crop requires more length of season than our climate affords, as it is not, frequently, above the third or fourth pod that is filled with ripened grain.

From these causes, farmers, even remarkable for their understanding and their management, are often disappointed in their pease crop. A horse hoed crop of potatoes, beans, or turnips, may, undoubtedly, be raised, wherever a crop of pease is attempted, and with more profit. Nay, a compleat summer fallow would always turn out to more advantage, than what is generally reaped by a crop of pease.

For the above reasons, it really appears proper, that the broadcast pease crop should be entirely laid aside, not only in the neighbourhood of Edinburgh, but over all Scotland. If pease are to be sown at all, another variety of the grain should be adopted, the white pea: and, of this sort, that which is called the Essex Reading promises to be the best. It affords straw equal to that of the grey pea, and is more early and prolific. Upon land sufficiently clean, there can be no doubt of its affording a more beneficial crop. In the immediate vicinity of Edinburgh especially, whether it was to be pulled green, or allowed to ripen for pot use, it would, undoubtedly, be more profitable than any crop of grey pease, on the same ground.

Clover.—To have nothing growing upon land but what has been sown, is the perfection of husbandry. Yet it is but too well known, that more than half the produce of Scotland is lost by weeds. They can only be restrained and extirpated by the most accurate culture: and, notwithstanding the great care of the farmers in this part of the country, weeds still prevail, and the crops suffer considerably.

Bulky weeds, which overtop the corn, are the most conspicuous, but they are far from being the most prejudicial. The natural grasses are more hurtful to a white crop, than all other weeds put together. They vegetate so quickly, and spread into a turf so powerfully, that they suffocate the corn at the root; and take full possession of the soil, in exclusion of the crop that was sown. So foul are some fields, that, when the thin crop of oats or barley is cut, there remains on the surface, a thick and rank sward of grass, fit for pasture, and all formed in the course of three or four months.

Where clover is sown, it is cut twice the first year; but the field is usually reserved for pasture the second year, and sometimes the third. After the first year, the clover wears out. The natural grasses resume their place, completely fill the soil, and form a thick sward. During this interval of pasture, they become so established, that the tillage of two or three succeeding years is unable to subdue them. To extirpate them, should be the great object, in land destined for the production of corn. But this can never be done, while the clover crop is continued beyond one year.

Tares.—A piece of summer tares or vetches is sown here, almost on every farm; and is very convenient, by affording an excellent green forage, after the strength of the summer grass is over, and in the interval between the first and second cutting of clover.

The tare is a very hardy plant, and capable of of continuing its vegetation through the whole winter. In England, it is therefore sown in autumn, in order to produce green food in the spring. The summer and winter tares are the same plant, distinguished by these names, only from the season in which they are raised.

Winter tares are sometimes sown in England, so late as the 1st of November, and cut in April and May. But were they to be cultivated here, a more early season would be eligible. They might be sown the first or second week of September. If it could be done a week or two sooner, so much the better; that the tares might have the advantage of the whole autumnal growth, and afford their crop sooner in the spring, when it is most wanted. A supply of green forage, for about eight weeks, from the 1st of March to the end of April, is well known to be one of the most desirable acquisitions in the husbandry of Scotland. This deficiency may, no doubt, be, in some degree, supplied by winter tares. They are a hearty food for all kinds of live-stock, from the horse to the hog; and may be profitably bestowed on them in the spring; but they might be most beneficially employed, during that season of scarcity, for the support of milk cows, and of ewes and lambs.

But the benefit arising from this production of a green crop in spring, upon land that would otherwise be lying in stubble, or unoccupied for five or six months, is not the only advantage to be reaped by sowing winter tares.

In all white crops, when the seeds are fully formed, and long before the crop is cut down, the progress and vegetation of the root ceases. The soil being no longer penetrated, kept open and moist, and indeed nourished by the growth of the roots, it dries, collapses, and hardens. Hence, chiefly, arises the deteriorating influence of a crop of white grain. —A green crop, on the other hand, continues to vegetate at the root, the whole season; and, if it is perennial, from year to year: and hence the meliorating effects of such crops.

By suffering land to remain in stubble, for three, four, or five months after harvest, the above hurtful effects of a white crop are continued and increased. This renders the stirring of land, as soon as possible after every white crop, highly expedient. It is not, therefore, merely for the value of the crop, that winter tares should be cultivated, but for the improvement of the soil. Every green crop meliorates; and we have no other so proper, that can be raised between autumn and spring.

The land to be chosen for winter tares, is that which has carried wheat; and for the following reasons:—it is usually the cleanest; it is the earliest reaped in the season; it forms the most valuable part of the farm, and well deserves every assistance that can be given to it; for the land that has carried wheat, which is the greatest impoverisher we have, may, undoubtedly, be bettered, by the additional green crop of tares, in the same year.

As soon as the wheat is removed, the land may be slightly ploughed; though the use of the plough is not, indeed, absolutely necessary. The scarificator, was it in use here, would be the proper instrument for the purpose; but the end may be answered in the most inexpensive way, by a heavy break-harrow. Was this to be passed over the stubble field, it would afford bed sufficient for sowing tares; to be covered immediately with a short toothed light harrow, and rolled. This is all the operation that is necessary, and it can neither be reckoned troublesome nor expensive. The crop of tares would be fit to be cut or pastured, between the 1st of March and the end of April.

It only remains to consider, how this process is to be made to correspond with a proper succeeding crop.

The crop of tares would be by far too late for sowing beans. Potatoes, indeed, might be planted in good time. The land would be in excellent condition for turnips—but these are not raised. Oats might be sown; but, though our farmers feed their wheat plentifully, by means of fallow and dung, they judiciously decline this crop after wheat. The only other crop, and the most eligible, is that of barley and clover. This, generally, succeeds their wheat; so that the winter tares would not interfere with their usual rotation, nor hurt any future crop. On the contrary, the soil being occupied, from the beginning of September to the middle of April, by an intervening green crop, it would not only be improved, but would require less tillage.

Lucern.—The culturé of lucern has failed with us, in a few places, as it must always do when sown broadcast: for it is a plant formed to succeed best in a horse hoed crop. There has never been but one compleat trial made of it in Scotland. This was by Mr Craik, of Arbigland. That venerable gentleman, the father of Scots farmers, when he began his horse hoed husbandry of wheat, found he would require the labour of a considerable number of horses in summer, and resolved to feed them upon lucern. For this purpose, he planted three acres, which were accurately horse hoed.

This piece of lucern continued in vigour and perfection for nine years. During this time, it supported twelve labouring horses, which were daily in the draught, from the first week of May till the second week in November, and sometimes later, without any other provender; and they were always in as good order as if they had been fed with hay and oats. From the beginning of May till the beginning of November, the lucern was always cut four times, and part of it often underwent a fifth cutting. Before each cutting, the intervals were so completely filled up, by the growth of the plant, that it appeared like a piece of broadcast herbage.

No clover, nor any other grass, natural or artificial, known as yet in this climate, is capable of affording so much green food, and of so good a quality, during that season. 'For lucern is not only early in its growth, but quick in its vegetation, through the whole summer and autumn: and is capable of withstanding, unimpaired, degrees of autumnal frost, which would render a second crop of clover good for nothing.

This important experiment in agriculture, has been too little known. But, alone, it warrants the cultivation of lucern, in the same manner, in other parts of Scotland. The soil in Galloway, on which this lucern was planted, was dry croft land, much worn out, but previously manured with sea shells. Much land there is in the neighbourhood of Edinburgh fitter for the purpose; and lime answering the same end as shells, may be had, if necessary, at a moderate price.

One, two, three, or four acres of it might be planted, according to the size of a farm; which would be easily cultivated, as horse hoeing is now generally practised. What was not consumed green, might be made into hay. But it would soon become an article of sale at Edinburgh, in summer, where there is a considerable demand for green forage. It is a heartier and more substantial food, than any other grass at present in use, and would sell at a higher price.

Labouring Cattle.—In summer, the labouring horses are turned out between yokings, to a field of indifferent pasture; sometimes indeed so poor, that there is not a bite for a horse, working perhaps eight or ten hours a day. The horses by this practice are kept low, are unfit for their full labour, and are soon worn out. Much valuable time is lost in driving them to the field, and in collecting them together; and a great supply of dung is lost to the farm. Besides, one acre of clover and rye-grass will feed horses better, and much sooner, in the house, than two acres of the same land can possibly do in pasture. Was there a command of lucern for this purpose, the advantage would be still greater. It comes sooner, lasts without intermission much later in the season than clover, and is much superior in quality as a green forage.

In short, wherever the full labour of horses is necessary in summer, their proper maintenance, the saving of time, the increase of manure, and the application of grass ground to the best account, all require, that they should be fed, not in the field, but in the stall. Compared to these advantages, the trouble of cutting clover or lucern, and of carrying them to the stable is but a trifle.

Live-Stock.—There is no breed of the domestic animals peculiar to the neighbourhood of Edinburgh. They are brought thither, of different sorts and sizes, from various parts of Scotland, England, and Ireland. The rearing of live-stock has not, as yet, been a leading object with the farmers. Their chief dependence has always been upon their corn and hay, which they raise with much skill and industry; for which they have always a ready market; and for which they pay a very high rent indeed; that is, from 2l. to 4l. per acre.

This forms a very singular case in husbandry.

The meat which supplies the markets of Edinburgh, is chiefly brought from a great distance: though it certainly might be afforded of a better quality, and with emolument to the farmer, in the immediate neighbourhood. Sheep, and even lambs, are driven sixty or seventy miles; fat oxen and cows fully as far; veal, and that sometimes of a poor quality, is carried thirty or forty miles; and bacon is imported from England. These articles, when properly managed, are the most profitable that can be raised upon a farm, and they always afford the most profit, on the most fertile soil. It is, therefore, somewhat surprising, that they should be neglected in the country, within eight miles of Edinburgh, which is a tract of the most productive land in North Britain.

It is almost an axiom, that, wherever land is capable of producing fat meat, it must always be more advantageously employed in that way, than in raising grain. In a bullock, a sheep, or a hog fully fattened, the vegetable produce of the soil is, as it were, concentrated. It then forms, and must form a costly article to the consumer; but it is always the most profitable one to the farmer. Accordingly, in every country, the most fertile and highest rented land is chiefly dedicated to this purpose. The neighbourhood, also, of almost every great town, might be quoted as an instance of this. The arable and pasture lands in Holland, the most valuable in Europe, and those in the neighbourhood of London, are not cultivated to raise corn and forage, but are principally applied for the fattening of cattle, and in raising the productions of the dairy. On the other hand, middling and inferior soils, that will not fatten, or that are remote from markets, are more properly employed for the purposes of grain and a breeding stock.

Agriculture, in its progress, naturally tends to the improvement of cattle for the market; and to attain this end, has been its greatest effort in every country. The farmers near Edinburgh have a superior advantage in this matter to farmers at a distance, which they have not in the raising of grain. Wheat, barley, and oats, can be brought at an easy rate, from Norfolk, from Ireland, or Caithness; but the Edinburgh markets for meat, cannot be supplied from these places.

Such high priced lands as those about Edinburgh, are no where occupied, merely for the production of corn and forage. Our farmers still raise these articles with advantage; but, by falling into this other train, and fall into it they probably will, as it is the natural train of agriculture, they will find their profits considerably increased.

This alteration, however, in the management of the lands about Edinburgh, can at best take place but in a gradual way; though there can be little doubt of its tendency to promote the advantage of the farmer, the interest of the landlord, and the conveniency of the metropolis.

To these remarks may be added,—the expediency of sowing all the grains more early in the season, and thicker than is commonly practised; a more frequent change of seed corn: the introduction of the scythe in reaping the crops; the employment of a few oxen in the plough upon every large farm, especially in hoeing the crops during summer; lime, which is to be had at a reasonable rate, and might in many places be advantageously used, is too much neglected.

Dairy.—For some years past, there has been a dairy kept here in a singular way. A considerable and respectable farmer, having occasion to keep some grounds in grass for several years, he employed them as a cow pasture. He sold all the milk to a dairy man in his village, at three half-pence the Scots pint. This man daily churned the milk sweet, and sold the butter and butter milk in Edinburgh, which were both of an excellent quality. By this business he earned a decent livelihood; and the farmer was freed from all the trouble and expence incurred by managing the milk of a considerable herd of cows. The wages and maintenance of servants are now so expensive, that, where milk sells at 2d. the Scots pint, it is questionable whether the farmer can have more, or even so much as three half-pence for it, after all the cost is defrayed in manufacturing it, either into butter or cheese. But an industrious and frugal cottager may have such a profit upon an article like this as the farmer cannot obtain.

Corstorphine Cream.—In this parish, and two or three others to the west, especially that of Corstorphine, there has been manufactured, immemorially, a preparation of milk, well known in Edinburgh by the name of Corstorphine cream. Yet, notwithstanding the name, it consists not, properly speaking, either of cream or milk, but entirely of one of the principles of which milk is composed.

All milk consists of three parts: one which forms butter; another which forms cheese; and the serum or whey with which both are combined.

The most eligible method of making Corstorphine cream, is found to be as follows:

A quantity of butter milk is taken, newly churned. Being deprived of the part which formed the butter, it consists of that which would form the cheese, united with the serum or whey of the milk. The butter milk is put into a close wooden vessel with a lid. This vessel is then immersed near to top, in another larger wooden vessel filled with boiling water. When the water is cold, the vessel with the butter milk is taken out. The cheesy part of the milk is then found concreted on the surface of the whey or wigg, as it is called, of the consistence of thick cream. The wigg is then drawn off from it, or it is taken up with a large scumming spoon, and forms Corstorphine cream.

By this process, the three essential parts of which milk consists, are completely separated, and turned perhaps to the best account.

The Corstorphine cream is composed entirely of the cheesy part, in an acescent state. It is separated both from the butter and the serum of the milk, is of an agreeable subacid taste, and has all the wholesome properties of butter milk. It is commonly eat with sugar, and forms a very pleasant and salutary article of diet in the summer season. It is sold in Edinburgh at 6d. the Scots pint; and, though it requires a little attention and labour, it is more profitable to the dairy than the sale of, the butter milk at the usual price.

The preparation of milk, known by the name of hatted kit, and frequently used by private families in the country, is very different. It is formed by mixing the butter milk with sweet milk or cream. This mixture is allowed to stand till the wigg is separated, which remains at bottom, and a hat or crust is formed at top, which is taken off. But, though this is much richer by receiving an addition of the buttery part of the milk, it is, to most people, not so agreeable as the plain Corstorphine cream which has no such addition.

FOSSILS.

In this parish, as in other places, where mountains extend their roots to near the level of the sea, a variety both of primitive and secondary fossils are to be found. All our mountains are chiefly composed of the primitive fossils—such as whinstone, micaceous rock, shorl rock, granite, schistus, and various other kinds, which, on that account, are sometimes called mountain rocks. Of these, all the Pentland hills are formed. On the other hand, the secondary strata, which are chiefly confined to the more depressed parts of the globe, such as sandstone, limetsone, coal, shiver, blaes, and ironstone, approach, in many places, to the base of these mountains, but never ascend them.

Grill.—Among the primitive fossils in this parish, may be noticed, that white rock which terminates one of the Pentland hills within view of Edinburgh *. The hill, on the face of which it is so conspicuous, is called Caerketan Craig, which is more than one thousand four hundred feet above the level of the sea, and is, at least towards the summit, entirely composed of this stone. A rock of this kind is known in some places, among miners and quarriers, by the name of a grill. It is a simple rock, or one of a uniform subtance to the eye; but contains both the siliceous and argillaceous earths. These are mixed in such a proportion, that, when the stone is calcined, it is capable, without any addition, of forming a fine stone-ware or porcelain.

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* Cyamea Pictlandica—The Pentland grill.

Some trials have been made, in which a stone-ware has been formed from this material, equal in quality to that of Staffordshire. A siliceous and argillaceous earth are necessary for the formation of the finest sorts of earthen ware, or of English china. The manufactures of this kind in Scotland have, hitherto, been supported by flint and clay brought from England. But, as this rock in the Pentland hills contains the two necessary ingredients, and in a just proportion, it will, probably, come to be of use in advancing these manufactures. It is a species of rock very singular, and has not yet been discovered in any other part of Scotland, nor described by any writer.

Basaltes.—Craiglockhart hill, which is about five hundred and forty feet above the sea, is composed of the same sort of whinrock as that of Arthur's Seat

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at Edinburgh. On its south-west side, the whinstone is formed into rude basaltic columns of the same kind, but not so perfect and well defined, as those on the west side of Arthur's Seat. Here, as in other places, the irregular parts of the whinrock and the columns are of the same substance, differing only in figure, and in the proportion and granulation of the materials of which they are composed. The fanciful ideas, that have of late been generally adopted, concerning the formation of these stones by volcanic fire, may prevail for a while; but must at length disappear, and give way to a more just and rational account of their origin.

Coal.—There has, of late, been a good deal of pains taken in searching for coal in this neighbourhood. The seams of coal which rise from the sea, between the Freegate burn and Inch Buckling brae, are supposed, not unreasonably, to be a continuation of the strata of coal on the opposite shore of Fife. These seams are very numerous, and stretched from the sea, upwards, through the valley of Mid-Lothian, for about twelve or fifteen miles, in a streak or direction between south and west; but every where avoid the hills which are composed of primitive rock.

It is not unlikely that seams similar to these, may rise from the sea, between Leith and Cramond. There are appearances of coal metals, and even of coal, on the shore between these two places; and the streak of the great coal strata at Dysart, lies in that direction. If there are any seams of coal in that tract, stretching westward from the sea, they must, in this part of the country, lie between Craiglockhart and Corstorphine hills. Both these hills are of primitive or whinrock, where no coal is to be expected; but the valley between them, about two miles broad, is composed of secondary strata, where abundance of coal metals appear. The great sandstone quarry of the Hailes lies in this tract, and the bituminous matter which abounds in the stone of that quarry, and in the other sandstones of the neighbourhood, may be thought to afford an indication of coal.

From Slateford upwards, for three miles on the north side of the river, there are regular strata of coal blaes*, impregnated with an iron vitriol, as in coal countries, which exudes and concretes on the surface of that shattery stone. The blaes, too, is every where intermixed with thin strata of dogger†; and both fossils are precisely of the same nature, and disposed in the same manner as they usually are directly above coal. It is true, indeed, that these fossils do accompany coal, wherever it is found, both in England and Scotland; but they are

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* Cherile *cinereum*. † Ovadrum *pessulatum*.

are likewise known to subsist in some places where no coal has as yet been discovered.

On the south side of the river again, towards the higher grounds and the hills, the rocks, so far as they appear, are quite different, and of the primitive kind. The bold rocks opposite to the manse, disposed in lofty arched strata, are, indeed, in substance, a sandstone, but not a freestone. It is formed into vertical strata, is extremely hard, does not admit water, nor obey the chissel; and is a true primitive rock, known among our quarriers and masons by the name of a bastard freestone, and sometimes by that of a bastard whin[*]. On this side of the river, therefore, there can be no reasonable expectation of coal. All search is needless, where any sort of whinstone or primitive rock abounds. Whatever trials may be made, had better be confined to the lower grounds, in Collington, Corstorphine, Currie, and Ratho parishes; especially where the above coal metals appear, and where, in boring, the auger passes through strata of sandstone.

Hailes Stone[†].—The Hailes quarry in this parish has been wrought above forty years, and, during that time, has yielded more money than any other quarry in Scotland. The essential ingredients of the beautiful building stone it affords, are sand and and clay. The proportion of the clay to the sand, in weight, is less than one to four; the clay answering as a cement to the particles of the sand. When the clay is separated, it is of a dusky blue colour, a little viscid while moist, brittle when dry, freely stains the fingers, but hardens in the fire. The sand when separated is white, composed of small equal particles. Viewed by a microscope, they appear bright white transparent crystals; a few of them irregular pyramids, but the greater part quite irregular in their figure. The dusky blue clay, and the white sand, mixed in the above proportion, form the agreeable blueish grey colour of the stone.

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[*] Scyrus *ruber*.

[†] Sympexium *bituminosum*.

But, beside these, there are other two ingredients which occur in the stone, though in a more sparing quantity; particles of a silver mica or glimmer, and which is more singular, streaks and veins of a black bituminous substance. But the stone is always most perfect and durable, and more agreeable to the eye, when freest of both.

In the different strata of this quarry, the stone differs considerably, with respect to its hardness, and its durability in the air. It is not among the strongest of our sandstones. Some of it is too soft to be trusted in the external parts of a building; but it is preferable to all the other quarry stones we have, for internal architecture. The elegant hanging stairs, so numerous in the houses of Edinburgh, are all formed of it. It is chosen, likewise, for chimney-pieces, hearths, and the pavement of halls and passages. For all these uses, its fine polish, its agreeable colour, and the easy manner in which it can be obtained in the quarry, of any size or thickness, render it peculiarly applicable. For these purposes, it has sometimes been carried to the distance of fifty miles.

The clay of this stone is not of the most viscid kind; and, hence, the stone becomes more liable to weather in the air. The strongest of our sandstones are those which contain the most viscid clay; whereas, those that are cemented with a bolar earth, which is not viscid, but falls to powder in water, are more feeble, and most apt to decay by exposure to the air.

The term, freestone, is properly applied in England, to all stones that cut freely with the chissel in any direction; whether sandstones or others of a different nature, having this property, such as the Portland, Purbeck, and Bath stone. In Scotland we have no freestones used in building, but what are sandstones; and, hence, the general term of freestone is, with us, improperly restricted to stones of this kind.

It is generally presumed, that all sandstones have been formed from strata of sand, whose separate particles have, in time, been cemented together, and hardened into one mass. But, from the appearances in the Hailes quarry, and indeed in all the other sandstone quarries in Scotland, it seems rather more probable, that all the strata of sandstone have been, originally, strata of impalpable clay; and, that the arenaceous particles they contain, have been formed, in progress of time, by crystallisation, in the place where they now subsist.

There is also found, in the Hailes quarry, loose masses of the black chalk *, used by our masons and carpenters, in drawing black lines upon wood or stone.

Chalcedony.—Near the bottom of Caerketan craig, about the place called Hillend Snab, there is a considerable body of what is termed agate rock †. This sort of rock is found in several parts of Scotland; especially in Kinnoul hill in Perthshire; on the shores near the town of Montrose; in some of the Hebrides, and other places. It is remarkable for having nodules of the semipellucid gems always imbedded in it; such as agate, onyx, chalcedony, sardonyx, and cornelian. At the above places, this rock contains many small dispersed nodules of onyx; but in some parts, considerable masses of chalcedony,

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* Pharmacitis *fabrilis*.

† Sarnius *onychiferus*.

cedony, very pure, and of a good quality. It also contains a terre verte, or green ochre of iron, called agate gall[*], which frequently incrusts the nodules of onyx lodged in this kind of rock.

PLANTS.

Woods.—To be acquainted with the quantity of wood that yet remains in the country, is of importance to the public at large. It is also of consequence to individual proprietors, to be well informed concerning the stock of timber in their particular districts. By this, the value of their woods may be justly determined, and also the expediency or inexpediency of further plantation.

The wood in this parish has, for many years, been gradually diminishing, and yet is still considerable. The natural and planted wood it contains at present, may be estimated in value, at about 6000l. or at about one year and an half of the whole landed rental of the parish. It consists, chiefly, of ash, Scots elm, plane, beech, and Scots pine. The ash, with the birch and alder, form the remains of the old natural wood of the country; but the others have all been planted. The ash is the indigenous tree. most generally dispersed over all Scotland, and is the most generally useful. It has, with us, the preference, in point of utility, to all other trees, as the oak has in England; and, for this reason, has been more frequently planted than any other forest tree.

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[*] Amphitane *onychina*.

Plantation.—The cultivated land here, as in most parts of the country, is by far too valuable for plantation, with a view to profit. It is even questionable, if any soil can be profitably planted, where either the scythe or the sickle have been in use to go. But the tracts in Scotland, unfit for these, and yet proper for plantation, are every where numerous and extensive; and, indeed, to such places plantation should be chiefly confined. Even in this parish, though for the most part highly cultivated, there is great room for plantation, in places incapable of tillage, and especially on the skirts of the Pentland hills. The low rent of these grounds as a sheep pasture, would, undoubtedly, render it highly profitable to convert them into woodlands. From the scarcity and high price of wood, even the building of cottages is now executed, almost entirely with foreign timber. The consumption of wood in mill machinery, for which purpose it always sells at the highest price, is much more than what the parish can afford, and gives great encouragement to plantation. For this purpose, the sallow [*], the red saugh [†], or the white willow*, are here capable of affording more profit than what could be obtained by the planting of oak.

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[*] Salix *caprea.* Linn.

[†] Salix *rubra.*

A plantation was formed by the late Mr Trotter, of Mortonhall, in the years 1764 and 1766, on the north side of one of the Pentland hills. It is situated about eight hundred feet above the level of the sea. It consists of five acres and three roods of sheep pasture; and, when inclosed for plantation, in a very inexpensive way, by a ditch and earthen dyke, was valued at 2s. 6d. the acre. Though it has, at times, been considerably thinned, the Scots firs in it at present, are about four feet distant at an average; so that there are about three thousand of them upon the acre. These are worth much more than 6d. each. But at that price they amount to 75l. the acre; the value of the whole, upon the five acres and three roods, being now 393l.

Beside this, the weedings cut before the year 1796, would have sold for 30l. There are also oaks, elms, and beeches, in this plantation, thirty feet distant, which are now fine trees, six inches diameter; and which, in thirty years more, will be of greater value than the land, and all the other trees it has hitherto produced. The original value of the land was not 15s. yearly, and is not now worth half a rent more than it would have been in the year 1766.

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* Salix *alba*. Linn.

An estimate of the profits of plantation, upon paper, is always surprising, and sometimes fallacious. But, after making every allowance concerning this plantation, it certainly authorises the following conclusion: That here, or in any other place, where wood gives the price it does in the neighbourhood of Edinburgh, such land cannot, in the course of thirty or of sixty years, be made to produce a third or even a fifth part so much, by any other method.

Prices of Timber.—Scots firs forty two years old, sell from 2s. 6d. to 4s. 6d. each, and that only at 6d. the cubic foot.

Scots fir of a large size gives 9d. the foot, when the foreign wood sells for about 1s. 4d.

Beech, 1s. 8d.

Ash, 2s., and sometimes 2s. 6d. without suiting any purpose particularly valuable.

Oak, 3s., and even 4s. This approaches to the value of English elm for a keel, which sometimes brings 6s.; the highest price, perhaps, which any timber gives in the place where it grows.

These prices, high as they are, must continue to increase, from the scarcity of wood, and the growing demand for it; which renders it more and more the interest of proprietors to form plantations.

Hedge-Rows.—Though much of the parish is inclosed with hedge and ditch, there has never been sufficient attention paid to the planting of hedge-row trees. That it is inexpedient to plant trees with a hedge, has become a prevailing opinion: but an opinion that seems not to be well founded.

α. A row of trees, even in the line of the hedge, does by no means destroy it as a fence, if it is properly dressed and preserved. How often do we see oaks in England, fit for ship timber, growing in the heart of a hedge, which is, notwithstanding, a sufficient fence?

β. The natural woods in Britain are now so exhausted, and all the planted woods, as also those which may be expected to be planted, so inadequate to the consumption of the kingdom, that it is upon the hedge-row trees, the country is chiefly to depend for a sufficient stock of wood. It is not unreasonable to suppose that two-thirds of all the wood of England, is at present situated in hedge-rows; and that, without this resource, fertile and rich as that kingdom is, it would now be in a state of distress for want of timber. In some parts of England, the hedge-row trees are of as much value as the land they inclose.

γ. That farm must be ill situated, that has not a tree upon it fit for a gate, nor a stick fit for a flail, or a cock-fence. To be well appointed, it should have wood upon it, sufficient for all the purposes of the farm; which in no way can be so easily obtained, as by raising hedge-row trees. Where a farmer has every bit of wood to buy, and bring from a distance, the expence is excessive. But it is an expence that must fall ultimately upon the landlord, though he might easily avoid it.

δ. As every young hedge must be fenced, the same fence that protects the hedge, will protect the hedge-row. Five or six feet, necessary for the spread of the hedge, when full grown, are also sufficient for the line of trees: so that in no situation can trees be planted at so little expence, either of money or soil.

ε. Many hedges are planted in Scotland, but few of them ever arrive at perfection, for want of sufficient care. It may be observed, however, that the hedge which is planted with a row of trees, is usually better looked after, than the hedge that is planted without them.

ζ. The ornament of hedge-rows to the country, and the shelter which they afford, both to the corn and cattle, will not be questioned.

n. For these and other reasons, the planting of hedge-rows seems highly expedient, both for the proprietors of land and for the public. The trees planted, should not be too young, nor placed in the line of the hedge, but two or three feet distant. A proper selection of trees is also necessary, according to the soil and situation; but the Scots pine, and even the ash, valuable as it is, ought always to be excluded.

Trees.—At Redhall, there are many old timber trees, chiefly elms, ashes, and planes, which are a great ornament to that fine place. The most considerable one is a plane, situated by the side of the road between the house and the garden, and the largest tree in the parish. It is above seventy feet high, and the circumference of its trunk, four feet above ground, measures eight feet.

Balsam Poplar.—This fine tree was first raised anno 1770, by Mr Wright, in his nursery garden at Leith, by seeds sent from Quebec. It is so easily propagated, by cuttings, that it is now become frequent in the gardens and plantations of Scotland. Early in spring, it is in full leaf, before any other tree. Its foliage is then most agreeable to the eye, and perfumes all the surrounding air. It is hardy, and of a free and vigorous growth, so that it promises to be a forest tree of a large size; but we are as yet unacquainted with the qualities of its timber.

In the shrubbery at Craiglockhart there is a balsam poplar, which was one of those first raised from seeds at Leith; and, by being planted in a favourable situation, is not only one of the oldest, but is now perhaps the finest tree of the kind in Scotland. It is regularly branched, of a fine form, and about forty-seven feet high. Four feet above the surface of the ground, its trunk measures forty inches.

Gardens.—There are exceeding good fruit gardens at Craiglockhart, Redhall, Hailes, and Spylaw, in which many of the best kinds of standard and wall-fruit ripen in great perfection. Close by the side of the river, in the garden at the manse, there are, generally, above one thousand species of exotic plants. Some of these, thrown out of the garden with seeds, have begun to take place on the sides of the river below. There are few indigenous plants in the parish or its immediate neighbourhood, but what are to be found in other parts of Scotland. The most unfrequent species are the following.

Campanula *latifolia.* Linn.
Ornithogalum *umbellatum.* Linn.
Saxifraga *tridactylites.* Linn.
Dianthus *deltoides.* Linn.
Potentilla *argentea.* Linn.
Orobus *sylvaticus.* Linn.
Vicia *sylvatica.* Linn.
Astragalus *glyciphyllus.* Linn.
Osmunda *lunaria.* Linn.
Pteris *britannica.*

Lycopodium *alpinum.* Linn.
——— *inundatum.* Linn.
Riccia *fruticulosa.* Dickson
Lichen *quartzosus.*
Tremella *pictlandica.*
Agaricus *viridis.*
——— *floccosus.*
Boletus *malchi.*
Peziza *anfractuosa.*
——— *grisea.* Brown.
Clavaria *puccinia.*
Lycoperdon *cyathiforme.*
——— *pyrium.*
——— *hypnoides.*

ANIMALS.

Birds.—There are three birds which breed in the northern countries, but frequent the river side here in winter, though only indeed during the time of severe frost and deep snow. These are the snow-fleck[*], the brambling[†], and the Bohemian chatterer[‡]. That these, and other small birds, should annually pass and repass over the ocean, lying between Scotland and the northern parts of Scandinavia, is truly surprising.

The long-tailed titmouse[§] appears here among the trees upon the river, pretty regularly about the 22d of February, but does not continue above two or three days. It is at that time, probably, passing from its winter abode, to the place where it breeds in summer.—The favourite food of this bird seems to be the catkin of the alder.

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[*] Emberiza *nivalis.* Linn.

[†] Fringilla *montifringilla.* Linn.

[‡] Lanius *garrulus.* Linn.

[§] Parus *caudatus.* Linn.

We have, also, rather too many of the small birds, called the ox-eye ||, and the pink, or blue titmouse ¶. These live much on the flower-buds of fruit trees, and are particularly hurtful to the early flowering stone fruit. The former is likewise a notorious bee-eater, and has been known to depopulate almost a whole hive.

The kings-fisher * appears upon the river, about the 1st of October; but this beautiful stranger remains only for a few days. The bullfinch †, also, is sometimes seen early in the spring, but makes no stay. These birds are here, only passengers from their summer to their winter, or from their winter to their summer residence.

Insects.—The lands belonging to the farm, called Juniper Green, were, formerly, moorish grounds, covered with juniper. They are now inclosed and cultivated, nor is there a plant of juniper to be seen.

But,

|| Parus *major*. Linn.
¶ Parus *coeruleus*. Linn.
* Alcedo *ispida*. Linn.
† Loxia *pyrrhula*. Linn.

But, though the junipers are gone, a beautiful insect, the juniper bug ‡, still remains in the neighbourhood, and especially on the glebe. The juniper had, no doubt, determined the residence of the insect, in this place, being its favourite food. But, that plant being extirpated, it now subsists upon others, which is the case with most insects.

Bees.—There are about thirty-five winter hives of bees in the parish, and, formerly, they were much more numerous. But, though this number is larger than in many other parishes, it is nothing to what might, and indeed to what should be kept in such a space of the country. The raising of honey and wax is an object of national economy, and a proper and lucrative employment for many members of the community. It is not below the attention of proprietors and of the most considerable farmers, but it is an employment peculiarly proper for the smaller tenants and cottagers. This body of people being so numerous, it is by their means only, that the full produce of the country, in honey and wax, can possibly be collected. To persons of this class, the cultivation of bees is capable of being peculiarly advantageous. Every cottager who has a kail-yard, may have two, three, or more hives of bees. Each hive, at a moderate computation, may afford 30s. a year.

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‡ Cimex *juniperinus*. Linn.

If he has three hives, the annual profit amounts to 4l. 10s.; and, to such a person, this sum makes all the difference between a poor man and a rich. It is happy, as in this case, where the interest of the public is advanced by the prosperity and comfort of the lower and meritorious ranks of the community.

It does not appear, what number of bee-hives may be supported in the kingdom at large, or in any particular part of it. We know, as yet, of no limits to the quantity of honey and wax which may be raised in the country; and the demand for them appears, as yet, likewise unlimited. But it is well known, that no part of Scotland has, hitherto, been overstocked with bees; though, in a few particular parishes, one, two, and even three hundred winter hives are sometimes preserved. Was this the case in general, the produce of the country, in honey and wax, would become very important.

The following method of increasing the quantity of honey, deserves to be universally known and practised, which, many years ago, occurred in this neighbourhood. In the beginning of August 1759, at a remote place, in the heart of the Pentland hills, the heather, which was just then begun to flower, was observed to be covered with hive-bees, though it was known that there was not a bee-hive within five or six miles of the place. James Birkmyre, a farmer in Glencross, who kept bees, was persuaded, a few days afterwards, to send up a weak second swarm, to a herd's house in that part of the hills. It stood there till the beginning of October. When brought back, it was much heavier than the top swarm, and stood successfully through the winter, which, otherwise, it could not have done.

This success encouraged him and others to repeat the experiment, and the practice soon became pretty frequent, both on the south and north side of the Pentland hills. Captain Kennedy, of Kailzie, who was a great bee-master, immediately followed this method, and, his situation being very convenient for it, he continued, for many years, to find it most advantageous. The practice is now well known in Tweeddale, Lammermoor, and some other places, but is still unknown in many others, and no where so much pursued as it deserves.

On our mountains, and in our muirs and mosses, the common heather* covers the whole surface of the earth for a great extent; and, in the season, forms one continued carpet of flowers. No part of the country ever affords so rich a field of bee pasture. For there are few flowers which yield more honey than those of heather; and they are twenty fold more numerous in the same space, than any others. The muirland honey, as it is called, which is produced from them, has always been much esteemed. It is of a brown colour, but perfectly transparent and pure; and not inferior in strength and flavour, to the honey either of Narbonne or Minorca.

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* Erica *vulgaris*. Linn.

About the 8th of August, the flowers of our fields are mostly gone; and the quantity of honey made after that period, is inconsiderable. It is on or about that day, that the heather only begins to blow, even in the low parts of the country; and in higher situations, not till the 20th, or towards the end of that month. In most places, it is in full flower till the middle of September, and in many, till the first of October. It is then, that the bees, finding their pasture exhausted at home, fly abroad, six or eight, and perhaps, more miles, to collect honey from the heather. This must render their work tedious, compared to what it would be if the heather was at hand. When the bees are placed in the midst of it, it is probable that they bring home daily, six or eight, or more loads for one. Accordingly, the sudden increase of weight, in all bee-hives that are carried to the muirlands during the blooming of the heather, is most remarkable. In the cultivated parts of the country, it is questionable, if bees, in the same time, and within the same space, can collect so much honey, even in June, as they can on a wild heath, in the months of August and September.

The wide extended districts of Scotland, where heather does chiefly prevail, are usually distant from any dwellings where bees are kept. The hives, therefore, require to be transported to this muirland pasture, about the 8th of August. They can be carried under night, six or eight miles with safety, and probably to a much greater distance.

The best place for raising honey in summer, is the sea-shore, where the herbage is remarkably flowery, and where the flowers come early in the season. But the most eligible situation for bees, of all others, is, where this summer pasture can be assisted with the autumnal pasture upon heather, by the removal of the hives. Situations of this kind abound remarkably in the Highlands.

It is to be regretted that the culture of bees has been so much neglected in the Highland countries; as they have, generally, both the advantage of the sea-shore, and of extensive muirs and mountains covered with heather. The practice now described, though there quite unknown, might, undoubtedly, be rendered most beneficial. Without any exaggeration, it may be affirmed, that there are many extensive heaths in the Highlands, capable of affording more profit as a bee pasture, than as a pasture either for black cattle or sheep. There are many tracts covered with heather, which do not rent at 6d. an acre. But, if two acres of such heath could afford but one Scots pint of honey, which is a moderate computation, this would be a greater profit than what they at present yield. It is a favourable circumstance in the raising of honey and wax, that they can be obtained from the most barren soils, and every where indeed, without encroaching on any other production. They may be profitable to the individual, and they are all so much gain to the public.

The greatest obstacle to the propagation of bees in this parish, and in most parts of Scotland, is the stealing of the hives. Being necessarily exposed, like sheep on a hill, or plough irons in a field, they stand in need of peculiar protection. As it is a theft which is seldom detected, its detection should always meet with the full severity of the law. This, and many other crimes, seemingly small, for want of detection and due punishment, produce very general and hurtful consequences in society. To check vice in its beginnings, is the most effectual method to obstruct its progress. A strict cognizance of small offences is the best way to obviate those of magnitude. To prevent great crimes, the power of the laws, and the police of a country, never can be so successfully employed, as in exposing and punishing those, which are but too often considered as of a trivial nature.

ANTIQUITIES.

Names.—The names of places here, like that of the parish, are almost all of British or Saxon origin. In the western counties of Scotland, from the Clyde to the Nith, the names of places are all derived from the Gaelic language. But, in the midland and eastern counties, south of the Forth, the British and Saxon names prevail. Yet, even in these counties, many Gaelic names still subsist, notwithstanding the frequent invasions of the Britons and Saxons, and their continued residence in the country, upon many occasions. Of the names of places in this parish, there occurs but one, evidently derived from the Gaelic. This is Torfin, the name of a considerable, and very old farm-stead, upon the hills. The Gaelic names of places are well known to be emphatically descriptive of their situation; and it is remarkably the case in this instance. Tor, in Gaelic, signifies a heap of piled rocks; and the word fin, or fion, is the colour grey. Accordingly, the farm house of Torfin stands at the foot of a remarkable face or pile of grey whinstone rocks, which is seen at a great distance. A Gaelic scholar, from the mere name, would be at once acquainted with the situation of the place.

Ancient Monuments.—On the lands of Comiston, there are still the vestiges of a very large and antient encampment. It had been of an oval figure, surrounded by one great ditch and rampart, and contained about fifty acres of ground; a space, in old times, sufficient for the reception of a very great army.

Adjacent to this camp, and near the house of Fair Mile Head, an extensive and important battle has been fought, in which the combatants had been extremely numerous, and the slaughter immense.

On this field of action, there had been erected two very large conical cairns of loose stones, and nearly contiguous to one another. These cairns remained entire, till the turnpike road in the neighbourhood came to be formed, when they were carried off and applied to that purpose. On removing these cairns, the remains of human bones were found: several fragments also of old arms were discovered; two of which are still in the possesion of Mr Trotter, of Mortonhall, the proprietor of the ground.

Both are heads of the Roman hasta, or formed after that model. The one is broken, both at the point and the base. It is five inches long, two broad at the under end; and strengthened with a thick elevated line, which runs along the middle. The other is more entire, and of a different form. Though impaired at the point, it is about seven inches long, and near three broad at the base, but quite flat, without any prominent line in the middle. It is furnished at the base, with six strong buttons, three on each side, for the purpose of fastening it into the shaft of the spear. These weapons are of bronze. The hardness and temper, which the Romans gave to this mixed metal, are remarkable. The metal in these two spears, however, is different. In tne first, it is of a deeper and copper colour; and, though much corroded, has not contracted a particle of green rust. In the other, it is of a lighter or brazen colour, and covered entirely with verdigrease.

Each of these spears was found inclosed in a stone coffin, along with the mouldering bones of a human body. The coffin was placed at the bottom, in the centre of each cairn, and was formed of hewn stones; whereas, all the other stone coffins which have been found in this field, were composed of rude boards of stone uncut, without any cairn over them. It is to be presumed, therefore, that, in the coffins under these two vast cairns, the remains of two very distinguished commanders had been deposited.

The great cairns of stone, which were more frequent in the country formerly than they are at present,

sent, as many of them have been demolished, are to be referred to different aeras. Some of them, undoubtedly, were constructed by the druids, and still remain adjacent to the druidical circle: but the greater part appears to have been erected as sepulchral monuments by the natives, while they waged war with the Romans, or with other enemies, after the departure of the Roman armies. We do not find, that any such monuments were reared by the Romans in the country, either for this or any other purpose. Fragments of Roman arms have been found in many of these cairns, as well as in those at Comiston, but unaccompanied with any other vestiges of the Romans. Such arms were, most probably, deposited by the natives, who had them in their possession; and to whom indeed they were necessary, in consequence of their long warfare, or intercourse with the Roman people. Stones, with the figure of the cross upon them, have been found in some of these cairns, which must, therefore, be of a later date than either of the former. There are others of an aera still posterior. The cairns yet remain on the field where the battle of the Largs was fought in the thirteenth century; and likewise those, where the battle of Inverlochy was fought, about the middle of the last century.

Not far from the three cairns above mentioned, there had likewise been erected, an upright pillar stone, which still remains. It is a rude massy block of whinstone, of a flat shape, and at present about seven feet high above the surface of the ground. It appears not to have had the chissel, or any inscription upon it. It has always been known, among the people of the country, by the name of the ket-stane; an old British word, signifying the battle stane, or stone. It has passed also, immemorially, by the name of Camus stane. This would seem to intimate its connexion with some Danish commander. But, whatever there may be in this, it appears to have given rise to Comiston; the name of the lands on which it is situated, and to the gentleman's residence upon them, belonging to the Forests of Comiston.

In order to discover how far this pillar reached under ground, and whether or not it was placed in a stone pedestal, there was a narrow cut made cautiously at the side of it. From this it appeared, that the pillar reached above four feet under the surface of the ground; and, at bottom, was placed on a body of tough tenacious clay, which had been brought from a distance, as there is nothing of the kind in the immediate neighbourhood. This was a simple but an ingenious and effectual device, for supporting a high and heavy column, in a rude age. All the columns and crosses we have in Scotland, wrought by the chissel, and placed in stone pedestals, are of a much later date.

Pillar stones of this kind are frequent in the Lothians, and indeed over all Scotland. None of them can be ascribed to the Romans; for that people nowhere erected stone monuments of such magnitude, destitute of sculpture and inscription. Besides, these single pillar stones are numerous, even in those parts of Scotland to which the Romans never had access. Some of them may be prior to the Roman invasion; as all those are unquestionably, which were erected during the subsistence of the Druidical religion; but the greater part of them are certainly of a posterior date. From the fourth to the twelfth century, this country appears to have been but one continued scene of war and slaughter. Most of the stone pillars still extant in Scotland, seem to have been the monuments of the numerous battles fought during that long and obscure period, and of which scarce any other vestige remains.

The vestiges, however, of this great battle, were they sufficiently known, would appear, probably, to be more remarkable under ground, than above. When the turnpike road which passes near the above cairns was formed, for more than a mile, the remains of dead bodies were everywhere thrown up, especially between the Fair Mile Head and Bowbridge. Most of them had been interred in stone coffins, each of which consisted of six coarse slabs of rock. These coffins were, in some places, lying as close and thick as in a church-yard; and the skeletons they contained, fell soon to dust, upon exposure to the air. In digging the ground for laying pipes to convey water to Edinburgh, there were lately found other stone coffins and skeletons, at a distance from the former place, but, no doubt, belonging to the same field of battle.

In laying open the above cairns, and many of the stone coffins, no urns, ashes, or charcoal, could be observed; nor any other appearance of burning the dead. To erect a tumulus or cairn over the dead, and especially on the field of battle, was a general practice among all the nations of antiquity; and the cairn was formed, either of stones or of earth, according to the nature of the country. This mode of sepulture prevailed among the ancient Britons: it was no less frequent among the Caledonians; and even among their descendants, down to the middle of the seventeenth century. But it does not appear that either of these nations ever burned their dead. This practice, however, was frequent, not only among the Romans, but also among the old Scandinavian and German nations, at least, in the case of their most renowned leaders. Wherever, therefore, human ashes in urns are found in cairns, which they frequently are, and sometimes inclosed in stone coffins, they are to be considered as the remains and monuments, not of the Caledonians or Britons, but either of the Romans, or of other foreign invaders, the

Norvegians, Danes, Normans, or Saxons. Many of these urns which have been found in Scotland, in cairns and other places, do, indeed, very much resemble Roman workmanship, in their fabric, in their shape, and ornaments; but they never have upon them any letters; they are not accompanied with any other Roman monuments; and are found even where the Romans never penetrated; so that there is no reason for ascribing them to that people. Notwithstanding this, it must be allowed as probable, that the Romans could not have possessed this country for so many years as they did, without leaving behind them some relics of their practice in burning the dead.

The craig, or steep rocky mountain, which forms the northern extremity of the Pentland hills, and makes a conspicuous figure at Edinburgh, hangs over this field of battle. It is called Caerketan craig. This name appears to be derived from the ket stane, above described, and the fortified camp adjacent, which, in the old British, was termed a caer; a word equivalent to castrum. It seems also probable, that the army which attacked this camp, had come down upon it from the hills, as the slaughter appears to have been entirely on that side.

These are all the data we have, and they are indeed but imperfect, to determine the aera of this battle, and the people by whom it was fought; who were the victors and who the vanquished. In the perusal of the old British and Scots historians, attention has been given to any account that might occur concerning this ancient military event. But no history of any battle so considerable as this must have been, is recorded to have happened in the place. It had been an action, however, by which the fate of this part of Britain was, certainly, at the time, decided. It was an event, then, too important to have been omitted, had it fallen within the knowledge of our old historians. It must have happened, therefore, at an aera, in which the light of history fails; either at some very remote, or during some very obscure period.

It could not have occurred previous to the entrance of the Romans, that is, before A. D. 81. For it does not appear, that, any where in Scotland, there was a fortified camp of such extent, or military works of such magnitude, as those now mentioned, previous to the Roman invasion. Besides, the heads of the Roman spears above described, plainly show, that it must have taken place, either while the Romans possessed the country, or after they left it.

No such action could have happened among the natives, while the Roman arms prevailed. It is also evident that it was a battle in which the Romans themselves had no concern. This large camp at Comiston is not Roman; but the army which occupied it, appears evidently to have repelled and conquered its assailants. The Romans were thrice defeated indeed, and only thrice; at the Grampians, on Benarte hill, and at the Cree; but, so far as we know, never received any such defeat in this part of the country. If they had, it was too considerable not to have been recorded. Besides, there is no Roman camp, no road, nor any other Roman monument in the neighbourhood. That a few Roman spears should be found on this field of battle, is easily accounted for. It is well known that the Caledonians long preserved many of the Roman arms; and these must have been still more frequent in the possession of the provincial Britons. We are therefore entitled to conclude, that these warlike monuments at Coniston, though antient, must be referred to some period after the Romans had abandoned North-Britain, that is, after A. D. 426.

There is no room for supposing the Saxons to have been combatants in this engagement, as the monuments that remain, are British, not Saxon. The establishment of that people, between the Tweed and the Forth, did not take place till A. D. 547. It was the Caledonians they had there to encounter, and not the Britons, who were then reduced and incorporated by those powerful invaders.

Neither

Neither is there any evidence of the Danes having been a party in this action; unless the pillar stone on the field, or Camus stane, be presumed, merely from the name, to be a monument over some fallen Danish chief; which forms but a very slight presumption. Before the invasion of the Romans, and during their continuance in Britain, we have no account of the descent of any of the northern nations upon the British coasts. If the Danes were concerned in this action, it must have happened posterior, and indeed several centuries after the departure of the Romans. The Norvegians and Danes did not infest the coasts of North-Britain, till the ninth century, and all their battles were with the Scots, not with the Britons. From their first appearance, we have an historical detail, in the old English and Scots writers, of almost all their invasions; none of which accord with the situation and size of this battle which had been fought at Comiston.

This camp at Comiston, in its figure and construction, is evidently a British camp, and of the largest size. The names Ket and Caer, the cairns, the pillar stone, and the mode of sepulture, are all British. Whoever was the opposing enemy, there can therefore be little doubt, that, in this bloody action, the Britons, who buried the dead, and erected these monuments, were the conquerors.

It happened, most probably, in the period between the departure of the Romans, and the establishment of the Saxons, that is, between A. D. 426, and A. D. 547; an aera, in which there is very little light afforded by our historians.

From the time that Julius Agricola reached the isthmus between the Forth and the Clyde, to the departure of the Romans, the country lying between the walls of Agricola and Adrian was occupied by the subdued Britons, living under the power of the Romans, and equally inimical to the Caledonians. These Britons were the Meatae, who, upon the retreat of the Romans, were left possessors of the relinquished province of Valentia. The Romans had no sooner retired than fierce wars immediately commenced between the Caledonians and these provincial Britons; but of which, we have no distinct account given by any historian. From the above detail, it appears probable, that it was at that period, and between these two nations, that this battle at Comiston was fought.

MEMORIAL

CONCERNING THE PRESENT SCARCITY OF GRAIN IN SCOTLAND. (1801 *.)

MANY causes have been assigned, and very opposite opinions formed, concerning the present scarcity of grain in Britain. The causes generally presumed, are those of an occasional nature, or such as appear more immediately to have produced this calamity.

It is not these, but a cause of a more remote kind, which has been but little noticed, that is the subject of the present Paper;—a cause which highly deserves attention; as it suggests a remedy for the present scarcity, not only easy and effectual, but expeditious;

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* As this Paper, a few copies of which were published in 1801, may be useful on the recurrence of the same calamity, it was thought proper to reprint it here.

peditious; as its salutary effects may be experienced within the present year.—

In hot and warm countries, mankind are disposed to live chiefly on vegetable aliment. The case however is different in the more temperate and colder regions of the earth. In such a climate as that of Britain, mankind have a great propensity to prefer animal to vegetable food. This disposition is, indeed, much restrained during the earlier periods of cultivation and improvement: but, by high improvements of the soil, by the increase of wealth, and the introduction of luxury, animal food is produced in greater abundance, and becomes more accessible to all ranks of men.

Scotland is a particular and striking instance of this general observation. In former times, the inhabitants consumed very little butcher meat; and lived chiefly on grain, garden stuff, milk, butter, cheese, eggs, poultry, game, and fish. The cattle which were raised went chiefly to England, and formed the principal article of export before the Union; but, since that period, though in consequence of increased cultivation, a much larger quantity of cattle is produced, their exportation has gradually diminished. By the improvements of the soil, by the increase of arts, manufactures, and trade, the consumption of flesh meat by the inhabitants

bitants is now perhaps ten times greater than it was in the end of the seventeenth century.

By this alteration, which has been most remarkable since the year 1750, the quantity of grain raised in Scotland, has been greatly abridged. It is now insufficient, even in the best years, to supply the inhabitants, which is evident from the necessary and increased importation. By a greater consumption of meat, we therefore find a remote, a gradual, but a most important cause of the scarcity of grain in the kingdom, for years past, and especially at present.

But, by a larger consumption of meat at present than in former times, not only the produce of grain, but human sustenance in general, is greatly diminished; and this of course must raise the price of all sorts of provisions whatever.

It may not be improper to mention one example of this, among many which might be adduced—a comparison between the produce of cattle and of corn on the same ground.

A Scots acre of good grass land, worth 40s. of yearly rent, will support and fatten five of our best sheep, from the 1st of May until the 1st of November. During that time the sheep will increase in weight 6lbs. a quarter, or 24lbs. each sheep. The meat, therefore, produced from this acre, during the season, amounts to 120lbs. This meat, at 6d. a pound, yields 3l. sterling; the tallow, skin, and offal, may give 1l. 15s. sterling; which forms to the grazier a large profit of 2l. 15s. sterling from the acre.

Let us next consider the produce of the same land in grain. If the above acre is ploughed and sown with oats, it will afford, on an average, ten bolls of that grain, which will yield 1280lbs. of oatmeal, little used and esteemed indeed in other countries, yet, from the experience of ages, in Scotland, Ireland, and the North of England, it is questionable if a more wholesome and nutrimental meal is obtained from any grain whatever.

It is true indeed, that both the landlord and tenant may receive, from the above acre when in pasture, as much profit, perhaps something more than by tillage, and with less trouble and risk.

This great difference in the quantity of vegetable and animal food, produced from an acre of land, is still more remarkable in the case of potatoes. On such an acre as that above mentioned, a middling crop of potatoes, raised in lazy beds, amounts to about fifty bolls. Each of these weighs 448lbs. avoirdupois; so that the whole acre produces 22,400lbs. or 11 tons 400 weight of potatoes. This quantity affords a daily allowance of 6lbs. of potatoes for ten men through the whole year. The three acres, therefore, necessary to support a labourer who lives chiefly upon meat, are capable to support no less than thirty labourers who live chiefly upon potatoes.

It is now well known, that many laborious people in Ireland, and in the Highlands of Scotland, live for about nine months of the year, almost entirely upon potatoes, without any addition except a little milk, butter, and salt fish. It is now fully ascertained, that no grain, meat, or any food whatever, is more wholesome, or better able to support mankind in health and strength. It would be well for the children under twelve years old, and of all ranks, if potatoes formed the chief part of their food. These amount to about one third of the whole inhabitants of the three kingdoms; and their support on vegetable diet, especially potatoes, would be highly conducive to their health and strength, as well as to the public utility.

But the quantity of vegetable aliment afforded by the yam potatoe, is still more remarkable. This root is capable to produce no less than seventy bolls, even on a horse hoed acre of land. These amount to 31,360lbs.; the greatest quantity of food that can possibly be raised from any equal extent of ground. At the rate of 6lbs. a day, it would afford provisions for no less than fourteen men through the whole year. And the three acres necessary to support a man with flesh meat, would yield from this root, vegetable provision sufficient for forty-two persons.

But the difference which arises to the public, from these different methods of occupying land, is indeed most surprising. A labourer, a manufacturer, or a mechanic, often consume at the rate of a pound of meat a day. The 120lbs. of meat, therefore, afforded by the above acre, cannot support such a consumer above one third of the year. For the single article of meat, he requires no less than three such acres to supply his wants. On the other hand, the single acre, affording 1280lbs. of oat-meal, is capable of supporting three laborious men, in health and vigour, and with less additional sustenance than the former consumer requires.

The labourer, therefore, who lives chiefly on meat, requires for his support about nine times the quantity of land that is necessary for the sustenance of a labourer who lives chiefly on grain. The population of Scotland, during the latter half of the last century, has been upon the increase. But this and other subsidiary causes combined, are insufficient to account for that great scarcity of grain which has taken place of late years.

The cause here specified, that is, the increase of pasturage and the diminution of tillage, in consequence of the increasing demand for butcher meat, has operated indeed gradually, but more powerfully than any other, in producing a scarcity of corn in Scotland.

As a remedy for that calamity which threatens more and more to prevail, it is necessary to obviate and remove this cause, by the enlargement of tillage, and especially on the present emergency.

The fertile arable lands in this country, long occupied as pasture, are chiefly those in the natural possession of landed proprietors, or upon large and extensive farms. These usually consist of the best soil, and enjoy the best climate in the country. If a due proportion of these lands was resigned to tillage, that is, from fifty to a hundred acres in each parish, this would be an ample security against the scarcity of grain in Scotland, even in the worst seasons. One landed proprietor has, of late years, added to the grass grounds about his seat, no less than twelve plough-gates of arable land. But that proprietor, whose love to his country is hereditary and well known, and others in a similar situation, would, no doubt, devote part of such lands for a season, to relieve the public distress, even though it did not conspire so much to their own emolument as it really does. A landed gentleman, by breaking up three or four acres of his old grass, would do more to alleviate the present public distress, than he can possibly accomplish by the most rigid household economy, or the most extensive use of substitutes for grain. The noblemen and landed gentlemen, on the present urgent occasion, both in the county and parochial meetings, have manifested the most laudable intentions towards their country. It is not easy to devise a measure better adapted for realising those intentions, than that which is here proposed. Nor is it to be doubted, that by the more extensive farmers and graziers, their example in this measure would be followed.

There are in Scotland about nine hundred landward parishes. If, in each of these, on an average, one hundred acres of such lands were brought into tillage, they might be presumed to produce nine hundred thousand bolls of oats.

This quantity would be a security against scarcity at all times, and a sufficient balance against the importation of such years as the last and the present, which has been the largest ever known.

This small proportion of our grass grounds cannot surely be applied to any purpose more beneficial. While they afford a most important advantage to the public, they would afford, the ensuing year, to proprietors and tenants, from 6l. to 12l. the acre, which is certainly more than can be obtained from them in pasture.

By subjecting such a proportion of our arable lands to the plough, the grazier needs not be alarmed. The proportion is comparatively small, and cannot have any effect disadvantageous to his interest.

During the late and present high price of grain, butcher meat has been surprisingly cheap. By diminishing our pasturage to the extent now mentioned, butcher meat must, in some degree, rise in its price. But this would never be felt by the public at large, to be so detrimental as the immoderate price of grain.

It must also be noticed, that this is a measure easy in its execution. Most noblemen and gentlemen retain in their own possession extensive grass grounds with little or no tillage; the pasturage of such grounds being to them more profitable, and accompanied with less trouble and risk. In our climate, however, and on our good soils, the pasture sensibly diminishes in a course of years; which is occasioned by a thick and luxuriant growth of the various mosses or muscous plants on the surface of the ground. This renders it necessary, after a number of years, to break up such lands, and to subject them to tillage for two or three years, in order to restore and improve the pasture: for this purpose such grass grounds are usually let off for two or three years to neighbouring farmers. The crops commonly taken, are two of oats and one of barley, and sometimes three of oats; when the land is again let for pasture. Such fields having lain long in grass are remarkably fertile, and for the three crops of grain often give an annual rent from 5l. to 8l. the acre. It may even be presumed that such lands might be let at present for 10l. an acre.

This proposal, therefore, of bringing old grass grounds into tillage, does not require a proprietor to engage in husbandry, or to provide ploughs, horses, and servants, for additional tillage. All that he has to do, is to let off for two or three crops of corn, such parts of his grass ground as are most convenient, and which, no doubt, may be let at present and meritoriously, at a very high rent.

The grounds here meant to be broken up, are such as have lain in grass, from eight to twenty years or upwards, and which may rent from 25s. to 50s. the Scots acre. The three white crops above mentioned are highly profitable, and are well known not to be injurious to such lands in such a situation.

The two crops of oats may be freely taken. The third year, the land should be sown with barley, red clover, and rye-grass, and a considerable quantity of white clover. As the emolument from these grasses is to belong entirely to the landlord, the expence of their seeds and of sowing them must be entirely his.

The fourth year the landlord will receive from such lands a profitable hay crop of clover and rye-grass.

In this process no manure is necessary upon such lands. After the fourth year they return again to grass, with the pasture considerably improved, being freed from a matted mass of decayed roots, and an injurious growth of mosses, with which it was overrun.

It must also be observed, as an additional and strong recommendation of this measure, that it is capable to afford the most immediate and expeditious relief from the present scarcity, and high prices of grain, that we can well expect.

To obtain these ends, other measures may be highly useful to remove the scarcity,, though slow in their operations. By the reclaiming of wild land, and by improvements in the subsisting laws respecting corn, much future though not immediate relief may arise. Other means, such as importation, may diminish the scarcity without reducing the prices.

But the measure here recommended, tends to reduce the prices by the introduction of plenty, and that within the space of eight or nine months.

When corn is to be raised upon grass grounds, an early season in winter is no doubt the most eligible for tillage; the months of January and February, however, answer well; and on a pressing occasion, such as the present, they may be ploughed and sown with oats during the whole months of March and April.

There is, therefore, time enough left for executing the measure here proposed in the present season. Such grass grounds as are above specified, never fail to produce a plentiful crop of oats the first year they are ploughed; and if a sufficient quantity of such land is brought into culture, before the first of May, there is good reason to be persuaded, that, before the end of September, this part of the kingdom may be blessed with plenty and cheapness.

P. S. It must likewise be added, that to this remedy the country may and ought to recur at any future and similar period. It needs not be subjected, as in former times, to successive years of scarcity and famine.

Should an excessive deficiency of grain occur in one year, it may be fully supplied within the course of another. If the measure now recommended had been followed to a proper extent in this year's crop, the scarcity by this time would have been alleviated, and that which it is to be apprehended may take place in the ensuing year effectually prevented.

The conversion of old grass grounds into corn fields, is not therefore to be considered, merely as a remedy for the present scarcity, but as an effectual security against such a disaster in future.

Let pasturage be extended as far as it can go, while compatible with a moderate price of grain: but beyond this it certainly ought not to be stretched.

If pasturage and tillage are to be viewed as the scales of a balance, the prosperity of the public requires that the latter rather than the former should preponderate.

A large quantity of rich pasture land, capable of being converted into tillage, is a most valuable possession for every country. It is a treasure that ought to be kept in reserve; it is a certain resource against famine; and, fortunately, such lands can never be rendered more profitable, than when they are applied to this most important purpose.

Collington, Dec. 26th 1800.